ARCHIVES OF OPHTHALMOLOGY.

EMPYEMA OF THE FRONTAL SINUS—ORBITAL COMPLICATION TREATED BY SUPER-HEATED STEAM.

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LESIONS of the frontal sinus are of interest to the rhinologist, the general surgeon, and the ophthalmologist, particularly to the last, when the lesion affects the orbit. Treatment of these lesions when the orbit has become invaded has not always been successful or satisfactory. In volume xxvii., page 294, of the ARCHIVES OF OPHTHALMOLOGY, appeared an article by Dr. GOLOVINE, of the Imperial University of Moscow, in which he reviews the literature of lesions of the frontal sinus and the operations for their relief, bringing forward an original method for obliterating the cavity by the use of superheated steam. In this article he states that where operative treatment is considered necessary it ought to embrace two conditions: first, that a complete cure be obtained; second, that the patient be not disfigured any more than necessary by the operation. He goes extensively into the results obtained in his first experiments on dogs and then on human subjects. Treatment of a case by his method and its observation through a period of several years will be interesting, for, as far as I know, no reports have appeared of cases treated in this way.

Albert D., aged fifty-one, consulted me first in October, 1897, suffering with severe cellulitis of the right orbit. His temperature was 100°, pulse 120, mind rather sluggish; orbital tissue

greatly infiltrated; eyelid closed, and ball pushed forward, downward, and inward; fluctuation above. Patient sent to hospital. A free opening was made in upper and outer third of orbit. There was a free discharge of thick offensive pus. Exploration with probe revealed a small, roughened area of bone in the upper portion of the orbit; an opening was found leading into an unusually large frontal sinus. Fluids passed into this opening discharged slowly into the nostril, but it was impossible to thoroughly empty the sinus in this way. Temperature and general condition rapidly improved. The orbit was dressed with compresses wet in solutions of acetate of aluminum; under its use the infiltration rapidly subsided. The opening into the sinus was kept open, through which the thick mucoid discharge could be washed out. An effort was now made to establish a permanent opening into the nostril. Examination revealed numerous polypi with thickened middle turbinated. After the polypi were removed and the tip of the turbinated cut away, fluids passed freely from opening in orbit into the nostril. The opening into the orbit was kept open and thorough irrigation continued three times a day for a period of six weeks. At the end of this time there was no diminution in the thick muco-purulent discharge. A more radical operation was determined upon. Under ether anæsthesia, an opening was made into the frontal sinus with small trephine at juncture of orbit with root of nose. The sinus was found to measure 32*mm* in its transverse diameter. The natural opening into the nose was enlarged and drainage tube passed from the sinus into the nose. The mucous membrane was curetted as thoroughly as possible. The wound was closed, all but a small opening left for drainage gauze below. There was no reaction following the operation. The opening into the orbit was then allowed to close. Irrigation was carried on through the external opening left and free drainage successfully kept up into the nose. Discharge stopped after this treatment had been carried on for three months. Patient was then discharged with instructions to keep nostril clean by the use of a nasal spray. On July 14, 1898, patient returned with profuse discharge of thick muco-purulent matter into nostril, headache, and feeling of dulness around the orbit. A few small polypi were found in the nostril, but these did not obstruct the free opening into the sinus. Irrigation through the nostril seemed to have no effect in lessening the quantity of discharge.

It was determined to make some radical attempt to obliterate the sinus. Chiselling away the anterior portion of the sinus would leave a very large, unsightly scar. There was no evidence of necrosis to justify such a measure. The procedure of Golovine seemed to hold out a simple and apparently safe method for obliterating the sinus. Under a general anæsthetic a new opening was made through the old scar tissue. Superheated steam was allowed to flow into the sinus for one minute; this was divided into three parts. For an instant the steam was allowed to pass in, after which the pipe was removed, then reapplied for an instant, and then removed and reapplied for a third time. The sinus was lightly packed with iodoform gauze and the patient put to bed. There was no reaction following the operation, no temperature, no headache, and no signs of cerebral disturbance. The only untoward occurrence was from the external burn which the steam produced during the operation. This caused some pain and annoyance. An effort was made during the operation to protect the external tissues, but not with entire success. The light packing of iodoform gauze was removed daily and the cavity irrigated with a fifty-per-cent. solution of peroxide of hydrogen. The sinus continued to grow smaller until November 14, 1898, at which time an opening the size of a No. 2 Bowman's probe and 5*mm* in depth was all that was left. There was no discharge. On July 3, 1899, I again had an opportunity of examining the patient. The opening had entirely closed. The scar had the appearance of an old bullet wound with a depressed centre, causing very little disfigurement; no exophthalmus; free movement of upper lid; nostril clear; no tenderness on pressure around orbit. On January 31, 1904, patient reports no return of trouble; nostril free; no tenderness around orbit; scar about the same, having quite the appearance of a small bullet wound.

The length of time it has been possible to follow this case makes it interesting, and would give positive assurance that obliteration was complete. Of course one case does not prove the efficacy of the operation, but, as the procedure is fairly simple and free from danger, it would seem a valuable method to use in selected cases. Steam is a powerful antiseptic, destroying all pathogenic micro-organisms, and would appear in this respect to be safer than almost any

other form of cauterant. It would at least be as free from danger as any of the strong chemical caustics used in the sinus. Before resorting to a radical operation, every reasonable effort should be made to cure a condition of this kind by irrigation and free drainage. Failing in this, some radical measure must be taken to obliterate the sinus; otherwise the thickened mucous membrane secreting pus and mucus might lead to serious complications in the way of necrosis and possible extension to the brain. Where cerebral symptoms are present, or where there is a necrosis of the anterior wall of the sinus, a radical operation, as proposed by Kuhnt (the chiselling away of the whole anterior wall), would be advisable. The question becomes one of safety rather than of looks. Even where this operation is performed, superheated steam would be the safest and best way of treating the remaining cavity. Extensive necrosis from neglected empyema of the frontal sinus, I have met twice in my practice. In one case the patient died from septic meningitis; in the other the necrosis extended to the anterior portion of the frontal bone. In both of these cases operation was refused until the disease had become very extensive.

The point where the secretions from the sinus usually break through into the orbit is found at the inner and upper angle of the orbit, where the bone is thin, although in three instances I have found the opening nearly in the middle of the orbit. Where pus is found in the upper portion of the orbit, a careful search should always be made for a possible opening into the frontal sinus. Very often what is apparently simple cellulitis resolves itself into infection of orbital tissue from the frontal sinus. If retention of secretions in the frontal sinus could be recognized early, undoubtedly many of the cases could be cured by proper treatment of the nose and probing of the natural opening, but, unfortunately, most of the cases seen by the ophthalmic surgeon are far advanced; either a fistulous opening is present, a displacement of the eyeball, or deformity of the orbit has manifested itself.

If steam is used, any apparatus can be utilized that will insure high temperature. The most available would be one

of the forms of steam atomizer used for throwing carbolic spray. There should be a pipe leading into a small additional metal chamber to one side of the atomizer, under which a second alcohol lamp is placed, so that the steam may be still further heated and free from moisture. From this second chamber a rather heavy rubber hose should lead to a small metal pipe. A small silver Eustachian catheter answers the purpose very well. This catheter should be passed through a rather large wooden handle, so that the heat will not burn the fingers of the operator. The illustration given in Golovine's original article explains very nicely this form of apparatus. The tissues around the opening must be as thoroughly protected from the steam as possible, otherwise they will be burned from the backward rush of steam. In my operation I used compresses wet with ice-water. This was not entirely successful. The better method would be to use a paste made of powdered asbestos. The asbestos can be sterilized by heat and then mixed with sterilized water. This packed around the tissue would protect it more thoroughly. The rubber pipe should be closed by pressure with fingers or stop-cock, while taking tip in and out of sinus, otherwise the tissues will be burned.

Conservative treatment should always be tried first. Steam is safe, thorough, reaching all portions of the sinus. With proper precautions this will leave a minimum amount of disfigurement. The operation is comparatively easy to perform. It is not applicable to cases of necrosis, or where the disease has extended to the brain. It may be used with advantage combined with the radical operation.

CHOROIDAL HEMORRHAGE FOLLOWING CATARACT EXTRACTION.[1]

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DURING the past year I have met with one of the rare and unfortunate accidents which occasionally follows cataract extraction. As this was the second one that I had seen, I thought that it might be interesting and at the same time instructive to look through the records of the Massachusetts Eye and Ear Infirmary to see how often choroidal hemorrhage had followed cataract extraction in that institution. With this end in view I have looked through the Infirmary records of the past forty years, and find that during that time there were 3624 extractions for *uncomplicated* senile cataract.

I have confined myself to cases which, at the time of operation, aside from the lens being opaque, were considered free from disease. Among these 3624 extractions, I find that choroidal hemorrhage has occurred but three times; a number of cases have been excluded, as the eye operated on was manifestly diseased at the time.

CASE I.—Dr. Quackenboss.—Mrs. H., age fifty-five, entered the Infirmary, October 15, 1903, for cataract extraction on the right eye. The sight in this eye had been failing for about two years. The left eye was operated on, at the Infirmary nine months before, by Dr. Chandler, with very good result.

[1] Read at the New England Ophthalmological Society, December, 1903.

Physical examination, negative. Heart normal. Urine negative. Blood-vessels not atheromatous.

Right eye: shows a mature cataract; functions good; tension normal; no sign of disease. Left eye: previous cataract extraction, with buttonhole of iris; fundus normal. The day following admission the right eye was operated on; operation under cocaine. I intended to do a simple extraction, with buttonhole of the iris, as this was the operation which had been done on the other eye.

The operation was without incident until I started to express the lens, then, with scarcely any pressure, the lens presented and seemed to be forced out of the eye, followed by quite an amount of fluid vitreous. The vitreous was cut off with scissors, and an examination of the eye just before applying the bandage showed the iris in good position, the anterior chamber re-established, with vitreous and the edges of the wound in good apposition. The patient complained of no pain during the operation and behaved well. After being removed to the ward she was taken with a sudden pain in the eye, and, inside of an hour, the bandage was soaked through with blood.

I saw the patient late that afternoon and found a second bandage discolored with blood; examination of the eye showed a large clot protruding from between the lids; the clot was apparently attached to the wound in the cornea; there was also a slight oozing of fresh blood. Enucleation was advised, but refused. The eye was cleaned up and bandage re-applied. The bleeding from the eye kept up for five days; this was followed by a purulent discharge attended with marked inflammatory symptoms. The eye became very painful, the entire cornea involved. Enucleation three weeks after operation.

Case 2.—Dr. Wadsworth.—(Reported in *Transactions of the American Ophthalmological Society*, 1897.) Female, age seventy-five, good general health. Physical examination negative. Eye apparently free from disease. Tension normal. Operation under cocaine, simple extraction. Removal of lens was followed almost immediately by a large amount of healthy vitreous, accompanied by severe pain. This was followed by a profuse hemorrhage from the interior of the eye. Immediate enucleation.

Case 3.—Dr. Spalding.—Female, age seventy; physical examination negative. Eye apparently free from disease. Tension normal. Operation under cocaine. Following the section in

the cornea, the lens came out spontaneously, with a loss of considerable vitreous; a free hemorrhage ensued. Immediate enucleation.

Dr. Frederick H. Verhoeff, pathologist at the Infirmary, has kindly given me a report of Cases 1 and 3; Case 2 having occurred before he took charge of the laboratory.

CASE 1.—*Macroscopic Examination.*—The globe is much distorted and somewhat box-shaped. The corneal wound (cataract incision) is filled with protruding hemorrhagic tissue, probably iris and ciliary body, which is covered with epithelium. The tissue at the limbus is much swollen and congested all around. At one situation the cornea is swollen to 3*mm* in thickness and is white and opaque. Its surface is much crumpled. The interior of the globe is completely filled by a hemorrhagic extravasation which has produced total separation of the retina and partial separation of the choroid. A small amount of vitreous humor can still be seen. The sclera is somewhat thinner than normal. The optic nerve and disc were cut away at the operation.

Microscopic Examination.—The cornea shows newly formed vessels running to the wound, but practically no infiltration with pus cells. The tissue filling the wound consists of granulation tissue containing many pus cells, which arises from the ciliary body and iris. This contains a certain amount of lens matter and a portion of the retina is also caught in it. The episcleral tissue shows a chronic inflammatory reaction. The portion of the iris within the globe is only slightly infiltrated with pus cells. The choroid is in great part disorganized by hemorrhage and in many places shows a marked chronic inflammatory reaction with production of granulation tissue. The retina is œdematous, but is not giving rise to an exudation of pus cells. The chief source of the hemorrhage is evidently the choroid. Sections stained for iron show an abundance of iron pigment within the globe, the greatest amount being in the choroid.

Pathological Diagnosis.— Disorganized globe. Intraocular hemorrhage in an early stage of organization. No evidence of infection.

CASE 2.—Dr. Wadsworth reports (*Transactions Amer. Ophth. Soc.*, 1897) that the enucleated eye was hardened and examined;

its cavity was filled with blood clot, which was situated in part beneath the extensively detached choroid. The few sections examined showed no apparent disease of the choroidal vessels.

CASE 3.—*Macroscopic Examination.*—The globe is completely filled with blood. There is total separation of the retina, almost total separation of the choroid, and extrusion of the ciliary body, iris, and retina, through the corneal section.

Microscopical Examination shows the structures of the eye disorganized by hemorrhage, but, with the exception of the pigment epithelium, otherwise apparently normal. Over the fundus the pigment epithelium shows advanced degenerative changes consisting in loss of pigment, swelling of the cells, which are filled with nuclear detritus, and the formation of colloid excrescences also filled with nuclear detritus. The choroidal vessels appear normal.

Pathological Diagnosis.—Disorganized globe. Advanced senile degeneration of pigment epithelium. The latter, indicates a degenerated condition of the choroidal vessels, although this is not sufficiently marked as to be evident under the microscope. The hemorrhage was probably due to rupture of the weakened choroidal vessels.

We may conclude that choroidal hemorrhage in uncomplicated cataract operations is a rare occurrence, happening at the Infirmary about once in 1200 cases; that its exact cause is unknown, but I think we may safely say that it is due to some degenerative process either in the choroid or in the choroidal vessels; that the two eyes are not always involved. Case 1 was successfully operated on for cataract in the other eye nine months previously. Dr. Wadsworth has successfully operated on the second eye of a patient at the Infirmary, when the first was lost from hemorrhage. As to treatment, when the accident has happened, I would advise immediate enucleation; preliminary iridectomy has been suggested for the second eye when cataract extraction is necessary.

TRACHOMA AMONG THE ANCIENT GREEKS AND ROMANS.

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THE question has frequently been discussed whether trachoma prevailed among the ancient Greeks and Romans as extensively as we find it to-day. At present it is an extremely widespread disease. In all countries of North Africa it is so frequent that, for example, it is hard to find in Egypt, Algiers, or Morocco a single native who does not show symptoms or complications of trachoma. This ailment is exceedingly common in Asia, Russia, and Japan, presenting scores of sufferers. In Europe an enormous number will be found in Spain, the southern portion of France, Italy, the entire Balkan States, Austria, and the European part of the Russian Empire.

As to the Western Hemisphere, it is quite prevalent in South America, though less so in the West Indies.

A considerable number of cases are met with in the United States, many being in immigrants.

Fortunately I have had wide opportunities to study trachoma, owing to the efforts of my father, Vincent Fukala. My most interesting experiences were during a journey to Austrian Poland, where I found, particularly among the Hebrews, trachoma in all stages of development, with unilateral and bilateral loss of the eye. Cases of such severity can only be found in Africa. These studies I followed for some time. At the close of these introductory paragraphs I wish to state that out of the 1560 millions of the globe's population, 30 millions have trachoma.

I now pass to the interesting subject of the prevalence of trachoma in ancient Rome and Greece, with special reference to Cicero, Pliny, and Horace, all of whom suffered from it to a marked degree.

Trachoma has certainly existed in almost every country at all times, and to a more marked degree in the Southern countries.

There is no doubt about its prevalence in ancient Greece, as mentioned by notable writers, such as Plato, Hippocrates, Galen, and others.

In this paper, however, I wish to prove that trachoma was actually *epidemic* among the population of ancient Rome at the time of Christ; and for this purpose I have studied the classics of reference and I have found that during that period the most conspicuous people of Rome were subject to severe trachoma, and I may state here *what none of the medical historians has ever mentioned, namely, that Cicero (106 B.C.) and Pliny, Jr. (62 A.D.), suffered from severe trachoma.* From these facts we readily see that many persons of Roman society suffered from this disorder. This is confirmed farther on by the satires of Horace.

In the first place, Cicero attracts our attention because he suffered from trachoma, which our ancestors called "lippitudo," and a person affected with it "lippus." The verb "lippire" meant to be affected with trachoma.

Cicero suffered markedly, and mentioned in his letters addressed to his friend Atticus frequently his "lippitudo."

The following passage taken from his Epistolæ, Liber VII., Epistola 13, is of interest: "Cicero Attico Sal." At the close of this letter he states:

"Si scripseram *ipse* longior epistola fuisset, sed dictavi propter lippitudinem."

Most of his letters were written about the year 48 B.C. He was unable to write the letters himself and dictated them to his secretary (librarius).

Liber VIII., Epist. 13, March, 48 B.C.: "Cicero Attico Salutem.

"Lippitudinis meæ tibi signum sit librarii [secretary] manus et eadem causa brevitatis, etsi quidem quod scrib-

erem nihil erat." Let the writing of my secretary be to you a sign of my "lippitudo," etc.

Lib. IX., Epistola 10, written April 15, 48 B.C. Beginning his letter, Cicero complains of violent pains which deprive him of his nightly rest.

"Cicero Attico sal. . . . Sed, cum me ægritudo non solum somno privaret, varum ne vigilare quidem sine *summo dolore* pateretur . . . " etc.

Similar complaints are mentioned in a letter dated May 8, 48 B.C. (Idus Maias, A. U. C. 705).

Liber X., Epist. 14. "Cicero Attico sal." In this communication he states:

"Mihi quidem etiam lippitudo hæc, propter quam non ipse ad te scribo, sine ulla lacrima est, sed sæpius odiosa est propter vigilias."

He suffered often from exacerbations of his disease.

Lib. X., Epist. 17, June 17, 48 B.C.:

"Crebro refricat [renews itself] lippitudo, non illa quidem perodiosa [very hated, painful] sed tamen quæ impediat scriptionem meam."

The subsequent passage indicates very distinctly that his ailment was of a trachomatous nature. Epistolas ad Atticum, Lib. VII., Kal. Febr. (=January 27th).

"Capuam Calibus proficiscens, cum fluenter lipperem, has litteras dedi . . . " etc.

A short time after this Cicero dictated the following letter because his sight was already so deteriorated that he was unable to write personally.

"Cicero Attico S. Mihi molestior lippitudo erat etiam; quam ante fuerat. *Dictare* tamen hanc litteram *malui*, quam nihil ad te litteram dare . . . " etc.

At the end of his "M. Tullii Ciceronis Tusculanarum Quæstionum ad Brutum," Lib. IV., he tells us about "perturbationes," remarking that an inveterate disease is obstinate to treatment and that an acute one (repentinus) or a "tumor" terminates more rapidly in recovery than does a trachoma of long standing.

"Inveteratio autem ut in corporibus ægrius depellitur, quam perturbatio; citusque repentinus oculorum tumor sonatur, quam diuturna lippitudo depellitur."

By "tumor" our medical ancestors understood any acute inflammation characterized by swelling (hence "tumor") and heat.

Still more plainly and exactly, Pliny, the nephew of the author of the *Historia Naturalis*, describes in his letters grave trachomatous conditions, and tells us about his sufferings in his *C. Plinii Cæcilii Secundi Epistolarum*, Lib. VII., Epistola **21**.

He came to Rome in a coach, the interior of which was darkened by curtains like a sleeping-room. Having suffered greatly, and having had his dormitory obscured by heavy curtains for both reasons, he was unable to write and read. The hallway of the house (crypto porticus) was kept dim in order to accustom him gradually to light. A hen which he had received as a present he recognized with his defective sight as a very fat one.

This is the letter:

"C. Plinius Cornuto Fusco suo S. Pareo, collega carissime, et infirmitati oculorum, ut jubes, consulo. Nam et huc tecto vehiculo undique inclusus, quasi in cubiculo perveni, et non stylo modo, verum etiam lectionibus, difficulter, sed abstineo, solisque auribus studeo, cubicula velis obductis opaca, nec tamen obscura facio. Crypto porticus quoque adopertis inferioribus fenestris, tantum umbræ, quantum luminis habet. Sic paulatim lucem ferre condisco [so I learn how to tolerate the light gradually]. Balneum assumo, quia prodest; vinum, quia non nocet, parcissime tamen. Ita assuevi et nunc custos adest. Gallinam, ut a te missam libenter accepi, quam fatis acribus oculis, quamquam adhuc lippis pinguissimam vidi.

"Vale!"

On further study I have found that Quintus Horatius (born 65 B.C.) mentioned in his satires very frequently persons affected with "lippitudo," and rendered the expression "lippus" a butt of ridicule. At the end of his very first satire he says: "Ne me Crispini scrinia [= archives, old writings] lippi compilasse putes."

Crispinus Lippus, a poet and stoic philosopher, received his cognomen "lippus" on account of his eye disease.

There is a passage of interest in Satire III., verse 25:

"Cum tua pervideas oculis mala lippus inunctis;
Cur in amicorum vitiis tam cernis acutum
Quam aut Aquila aut serpens Epidaurius? at tibi," etc.

Meaning: "May you observe your own defects with your anointed eyes; why do you detect the faults of your friends as keenly as an eagle or Epidaurian serpent?"

Again in Satire V., v. 30, he says: "Hic oculis ego nigra meis collyria lippus illinere" (Here I anointed my trachomatous eyes with black collyria). The collyria are said to have contained copper. This statement was made during his journey from Brindisium (Brindisi) to Rome: he also complained of other ocular discomforts.

Other mentions are found in Satire VIII., v. 3: "Omnibus et lippis notum," and in Epistolæ, Liber I., v. 29: "Non tamen idcirco contemnas lippus inungi" (Therefore, trachomatous sufferer, don't be ashamed of being anointed with a salve).

Epistola II. ad Lollium, v. 52: "Ut lippum pictæ labulæ," etc.

Horace was one of the unfortunate noblemen who had suffered from trachoma as described in Satire V., lib. I., vv. 48 and 49, where he tells us of the following during a visit at the summer residence of his friend Cocceius:

"Mæcenas went to play ball; Virgil and myself [Horace] went to bed, as the ball game is not suitable to trachomatous and dyspeptic persons" (Virgil was dyspeptic; consequently Horace suffered greatly, and his ailment was almost certainly trachoma).

The disease was very widespread, obstinate, and frequently it terminated in severe disturbances of sight, as in the case of Pliny, Jr. The other conjunctival diseases are not as obstinate, chronic, and serious as the condition described by Cicero, Pliny, and Horace. Pliny gradually became almost blind, due to running eyes. Trachoma only could have brought about this state of affairs, judging from the symptoms related by himself.

The disease was epidemic in ancient Rome and prevailed extensively among the plebeians, but the patricians suffered also, as described by the authors mentioned, cases among the well-to-do class having been far from uncommon. At that period it was thought to be ignominious to suffer from trachoma, and the word "lippus" was proverbially used as an invective as harsh in its meaning as is "favus" to-day.

A few words will not be amiss concerning the frequency of trachoma among negroes and mulattoes, according to my own observation. Swan Burnett[1] stated that the negroes of North America were practically immune as far as trachoma is concerned. Other authorities, however, contradicted this theory.

To verify the conclusion of Burnett, I made a journey to Havana, Cuba, in May, 1901. My intention was to familiarize myself with the diseases of a tropical country and to publish my experiences, which I did, in the *Ärztliche Centralzeitung*, Vienna, August 8, 1903.

While in Cuba, Dr. Santos Fernandez informed me that almost all cases of trachoma were imported by immigrants, and that, since great sanitary improvements had been brought about by the medical authorities, cases of trachoma had become much less frequent.

Another important factor bearing upon the infrequency of trachoma of the negro is the fact that *the lachrymal canal is of a much larger calibre in the negro than in the white race, hence greater drainage is afforded by this modified mechanism.* This plays the most important part in the relative immunity of this race.

Dr. Santos Fernandez, studying this subject carefully, has thoroughly mastered it, particularly as regards the frequency of trachoma among negroes and mulattoes.

The following statistical note is taken from cases he treated in his clinic at Havana during 1875–1899:

In 11,914 cases of diseases of the conjunctiva he found: out of 731 cases of conjunctival disease, 35 cases of trachoma in negroes; out of 983 cases of conjunctival disease, 60 cases

[1] See *Bericht über die Heidelberger ophthalm. Versammlung*, 1881, and Fuchs: *Die Ursachen u. Verhütung der Blindheit*, 1885.

of trachoma in mulattoes; out of 10,190 cases of conjunctival disease, 947 cases of trachoma in Caucasians.

Or, expressed in percentages:

(*a*) The white race has the greatest susceptibility to trachoma, showing a percentage of 45.1 % of all conjunctival disease.

(*b*) The mulattoes are less susceptible, showing 39 %.

(*c*) The negroes suffer least—only 24 %.

Hence we may venture to draw the following conclusions:

1. The negroes *do* possess a greater resistance than their Caucasian brethren.

2. Their immunity to trachoma is by no means absolute, but is only relative.

The effect of the climate has also to be taken into consideration, as the climate of Cuba is steady and favorable. Furthermore, the course of the disease is modified by the mode of living, intemperance and overeating lessening the resistance to trachoma.

The negroes of the United States are particularly prone to excesses, and many thereby diminish their resistance considerably, but never to the degree of the white man living in good hygienic surroundings.

Finally, it is of interest to know to what degree negroes of other countries suffer from trachoma, and notably those of Brazil. This matter was discussed at the Fourth International Congress at Madrid, 1903.[1] On this occasion Dr. Da Gama Pinto, with his wide experience, stated that in Rio de Janeiro he had observed scores of negroes attacked with trachoma, in all stages of its clinical development, many of them showing pannus, shrinking of the conjunctiva, corneal ulcers, etc.

Dr. Moura, of Brazil, also said that he had seen and treated trachoma in negroes, who had this disease in all possible degrees of severity. The inclemencies of the climate explain the frequency of the disease in Brazil, and the same applies to Egypt, the home of trachoma.

[1] See *Archivos de Ophtalmologia Hispano-Americanos*, 1903, c. iii. and iv., p. 168.

EXTIRPATION OF THE LACHRYMAL SAC AFTER INJECTION OF PARAFFIN.

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THE following are indications for extirpation of the lachrymal sac:

1. In cases of suppurating dacryocystitis where an eyeball operation, such as iridectomy for glaucoma or extraction of cataract, has to be performed. 2. In cases of dacryocystoblennorrhœa which the customary treatment of probing and syringing fails to cure. 3. In old people, or those that cannot endure the probing. 4. In cases of acute suppurative dacryocystitis recurring after supposed cure. 5. In some cases of lachrymal fistula. 6. In cases of suppurating dacryocystitis occurring in patients whose occupation subjects them to corneal injuries and consequently corneal ulceration (machinists, railroad employees, etc.).

Dr. R. A. Reeve, in Posey-Wright's text-book, describes the operation, and then expresses his opinion that the procedure is not easy by the following remark: "If this is not feasible the sac should be cut out piecemeal." Dr. C. R. Holmes says: "I do not consider the extirpation of the lachrymal sac and gland an easy operation, if performed in such manner that we shall have primary union of each wound and no injury of adjacent parts. This is especially true of the sac"; and he adds: "The administration of an anæsthetic is absolutely necessary for the perfect performance of the operation." Fox in his new work says: "Extirpation of the sac is recommended as a last resort, but the

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difficulty encountered in performing this operation usually causes it to be changed into one of destruction by the use of caustic and the cautery."

A good description of the ordinary operation will be found in the ARCHIVES OF OPHTHALMOLOGY, vol. xxxii., No. 4, 1903, by Arnold Knapp.

Extirpation of the lachrymal sac performed in the classical manner is not a simple procedure, because there is so much hemorrhage, and because the sac is indefinitely outlined and consequently oftentimes has to be removed piecemeal. The first operation I witnessed was not skilfully done, despite the fact that the results were good (the operation was performed by myself), and I choose to think that the difficulty arose not so much from the evident awkwardness and inexperience of the operator as from the method which the surgeon was attempting to follow. This prompted me later to devise the operation which I will describe. My first operation in which this method was used was in March, 1903. Lately I have endeavored to collect the literature upon this subject and have not found this method described, though I have secured an excellent paper by C. R. Holmes, presented at the American Medical Association meeting in 1898, in which occurs a paragraph,[1] making the fact evident that he was at that time endeavoring to obtain the object which is accomplished by the method here described, so that I presume ere this he, and perhaps others, may have practised the same procedure. Since, however, the method has not been described, I believe it is of sufficient value to warrant its presentation. While I am a firm believer of extirpation of the lachrymal sac in certain cases, I still continue the more conservative

[1] "In extirpating the sac, I do not think it best to open it if this can be avoided, but first try to hull it out without rupturing as we would a cyst. In order to more clearly outline the sac, I have in a few cases injected with a syringe through the slit canaliculi a thick starch, quite warm, and colored with iodine; then carefully withdraw the syringe and close the canaliculi with small hæmostatic forceps. This may not succeed in all cases, for the starch under pressure will, if the duct is open, escape into the nose, or under manipulation in dissecting it escapes by the canaliculi. I hope to have a substance which can be injected say at 105° F., and rapidly cooled to body temperature by placing ice over the sac, at which temperature it should be of such consistency as not to escape by a small opening, and, if any escaped into the surrounding tissue through a rupture in the sac, it would not act as an irritant, but be absorbed."—Dr. C. R. Holmes, ARCHIVES OF OPHTHALMOLOGY, 1899.

methods of probing, syringing, and the use of canulæ in hopeful cases. In this paper I will not take up your time in consideration of the subject in general nor discuss extirpation of the lachrymal gland.

Performed in the ordinary manner, the operation consumes considerable time, is inexact, as the operator does not know whether he has removed the entire sac; and it is altogether a formidable procedure. The operation is therefore one which many ophthalmologists hesitate to advise, though the efficacy in many cases cannot be questioned, for the results, when properly performed, are highly satisfactory in curing blennorrhœa, with all its attendant symptoms excepting epiphora, and even this symptom improves on account of relieving the septic inflammation. Again, the operation is refused by patients, because it requires time and the administration of a general anæsthetic. The operation which the writer begs to describe is as follows:

After the patient has been properly prepared, the contents of the sac are pressed out through the canaliculus (usually already slit); the sac is then thoroughly and repeatedly irrigated with boric-acid solution and also with argyrol or another antiseptic. By means of a paraffin or other suitable syringe, paraffin, prepared for surgical use with a melting point of 110°, is injected through the lower canaliculus into the sac until it is completely filled. This at once hardens and the sac is thus easily outlined. An incision is made in the skin over the sac in its long axis, extending from one quarter of an inch below the dome way down to the lower extremity of the swelling. The sac is exposed, can be easily seen, and dissected out by means of a knife, dull instruments, and scissors. It should be followed well down into the duct; if it is button-holed, no damage is done, as the paraffin is hard and will not escape. Any necrosed bone found should be curetted and drainage will take place into the nose. The skin is sutured and the canaliculi destroyed afterward by cauterization. By following these directions, no large vessels will be cut and the entire incision may be made below the tendo-oculi. If the latter is cut, it should be sutured. When a general anæsthetic is administered, the patient's

head may be dropped over the end of the table as in adenoid operations, to allow the hemorrhage to run out of the nostrils and prevent its entrance into the larynx. If cocaine is used, some should be injected into the sac previous to the injection of paraffin; and before making the incision the skin is anæsthetized by the infiltration method, in which case adrenalin also may be used.

A NEW FORMATION OF ELASTIC TISSUE IN THE ANTERIOR CHAMBER OF THE EYE.[1]

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(*With Plate V. of Vol. XLVIII. German Edition.*)

THE occurrence of a new formation of elastic tissue, so called glassy membrane, in the anterior chamber of eyes which have undergone destruction through iridocyclitis, etc., deserves to be brought to our notice. These cases undoubtedly have occurred much more frequently than a careful search of the literature reveals. Every positive case is, therefore, of interest, and should be recorded. This new formation of elastic tissue proves that the Descemet membrane, which has all the characteristic qualities of elastic tissue, when destroyed, can be replaced by a membrane identical with itself.

Stellwag (1) and Mueller (2) were the first to describe a simple thickening of the Descemet membrane as due to the apposition of elastic tissue. Shortly thereafter Donders (3) published two cases, in one of which the new formation covered the iris, and in the other it lay upon an exudation which existed between the iris and the cornea. Donders believed this new formation to be due to an exudation of the underlying membrane, which was able to secrete elastic substance and thus gradually by a process of apposition form an elastic membrane. At the same time he does not

[1] From the Laboratory in the Ophthalmological Clinic of the Royal Charity Hospital in Berlin.

deny that possibly the aqueous humor may have had some connection with this formation.

Michel, in an article, "Iris and Iritis," describes cases of iritis occurring in glaucoma in which the thickened endothelial layer upon the iris showed, as he expresses himself, a hyaline degeneration. I believe that the opinion of Wagenmann, in regard to these cases, should be accepted, viz., that the substance described as hyaline was probably after all elastic tissue. Wagenmann (5), who has devoted a great deal of time to the study of this new formation of elastic tissue in the anterior chamber of rabbits' eyes as well as human eyes, has thus aroused the attention of other observers in this same direction. The latest report upon this subject comes from Axenfeld. At the Congress of Ophthalmologists, held in Heidelberg, 1902, Axenfeld presented a case of absolute glaucoma, in which both the anterior and posterior surfaces of the iris were covered by a membrane which in appearance resembled the Descemet membrane.

The eye, which was given to me for examination, was taken from a collection which originally belonged to Prof. A. von Graefe, in the Charity Hospital. The history of the case, unfortunately, could not be found.

The globe was hardened in Mueller's fluid, dehydrated in alcohol, embedded in celloidin, and cut horizontally in series of sections 15μ in thickness. The specimens were stained with hæmatoxylin-eosin and borax-carmin. In order to demonstrate the elastic tissue, the Unna-Taenzer and Weigert stains were employed. The microscopic examination brought out the following picture. In form the cornea appears normal. Its epithelium shows degeneration, especially in the upper layers where the cells have already become horny. The lower layer is very irregular, and Bowman's membrane is entirely absent. The parenchyma of the cornea, especially in the peripheral portion of its upper layers, is pierced by a great number of newly formed blood-vessels. Only a few are found in the central portion. The corneal lamellæ are irregular, so that the whole picture of the cornea resembles a sclerotic degeneration. One finds in the neigh-

borhood of the absent Bowman's membrane, what is very characteristic of sclerosis, viz., amyloid substance.

As regards the resemblance to a degenerated pannus, as Baas (6) has described it, our case differs in the absence of Bowman's membrane and the deep position of the blood-vessels. In the centre the cornea appears to be of a greater thickness than normal. This fact will be explained later.

The Descemet is thickened through the apposition of elastic tissue. This tissue covers the entire posterior surface of the cornea, and cannot be distinguished from the Descemet membrane. In the angle of the anterior chamber, where the iris and cornea have become adherent, this new formation of elastic tissue has wedged its way in between the two. The anterior surface of the iris and even the pupil are covered by this membrane. In the angle of the anterior chamber we find a mass rich in oval cells, and resembling in appearance a capsular cataract. It is enclosed by this elastic membrane. A similar structure, but poorer in cells and of a more sclerotic nature, extends through the central portion of the anterior chamber from the cornea to the pupil. This is also enclosed by an elastic membrane, which is much thicker than that in the angle of the anterior chamber. The entire surface of the anterior chamber is covered by a layer of endothelium (see photograph). The thickest dimension of the elastic tissue is found on the posterior surface of the cornea, adjacent to the capsular cataract-like mass existing in the central portion of the anterior chamber (photograph, 1 and 4). It measures, including the Descemet membrane, 14.6μ. On each side of the central mass (*A*) this elastic membrane (8 and 3) measures 5.4μ. In the angle of the anterior chamber (6 and 7) it varies between 1.8μ and 2.3μ. On the anterior surface of the iris (2) it is 14μ in thickness. The measurements on the posterior surface of the cornea, when compared with the normal ones of the Descemet membrane, as recorded by Greeff (7), Mueller (7), and Vries (9), are very much greater.

The peripheral portion of the iris is adherent to the posterior surface of the cornea. It is very much atrophied and occupied by a great number of degenerated blood-vessels.

The capsule of the lens is normal. There is an anterior capsular cataract. Of actual lens substance only small remnants can be detected. The posterior chamber is filled with pigment granules, fibrin, and coagulated albumin. A hemorrhagic exudation in the suprachoroidal space has pushed forward the ciliary body. The ciliary processes are atrophied and distorted. There is a total detachment of the retina. The individual layers of this degenerated retina, thickened through the formation of connective tissue, are no longer to be recognized. Between the lamina vitrea of the choroid and the retina we find bone substance, and what is extremely rare and worthy of mention, actual fat tissue. The sclera is in a state of sclerosis. Another remarkable fact is that the optic papilla shows no excavation.

We have here, to recapitulate, a case of chronic iridocyclitis, in which there occurred a new formation of elastic tissue in the anterior portion of the eye, bone and fat tissue in the posterior portion.

Wagenmann believes that the primary cause for this formation of elastic tissue is due to an irritation of the endothelium. These endothelial cells proliferate and eventually produce an elastic tissue which in every way resembles the Descemet membrane. Furthermore, Wagenmann believes that this endothelial layer of the cornea can proliferate to such an extent that it may cover the iris, and here also produce an elastic membrane. The cataract-like mass in the anterior chamber of the eye, which is very similar to a capsular cataract, and recognized by Wagenmann as endothelial connective tissue, he believes to be due to a circumscribed proliferation of the endothelial cells. This production of elastic tissue from endothelial cells has been substantiated by other authors. The cases of iritis published by Michel and Birnbacher prove beyond a doubt that the endothelium on the surface of the iris may proliferate in a similar manner to that of the cornea. Michel believes that through this proliferation he has seen the production of hyaline membrane result.

The production of a glassy membrane or elastic tissue through the proliferation of the endothelium on the surface

Fig. 1.

VERLAG VON J. F. BERGMANN IN WIESBADEN.

of the iris (not only on the cornea) my own case seems to prove. It is so thoroughly incorporated with the tissue of the iris that one can hardly believe it to be due to the proliferation of the endothelial coating of the cornea growing over from the cornea onto the iris.

This, however, can only be stated as a positive fact when a case will be published in which only the endothelial layer of the iris has undergone proliferation with the formation of a glassy membrane. Probably the case of Michel is such a one. The cataract-like masses in the central and peripheral portions of the anterior chamber are the expression of a circumscribed proliferation of the endothelium. On microscopic examination one finds within these masses endothelial cells, as reported in similar cases by Donders, Wagenmann, and Greeff (9). The central mass is surely not a pyramidal cataract, as there appears to be no connection between it and the lens, nor do we find any evidence of a perforation in the cornea. This central connective-tissue-like cataract, through contraction, has drawn the posterior lamellæ of the cornea away from the rest of the parenchyma and produced in this way an apparent thickening.

Like the cases reported by Wagenmann and Donders, etc., so our own attaches importance to the fact that the Descemet membrane is a cuticular structure, originating from the endothelium.

This endothelium when it proliferates can produce either a cataract-like tissue or a glassy membrane. This glassy membrane can replace the Descemet membrane when the latter is destroyed, in such a manner that it is impossible to distinguish between the two.

I wish here to express my thanks for the material, as well as the interest and valuable aid which Professor Greeff gave to me in his laboratory.

Fig. I.—Photograph of Specimen.

1–7, elastic membrane in the anterior chamber.

b and *c*, cataract-like masses in the angle of the anterior chamber; and *A*, a similar mass in the central portion.

E, capsular cataract.

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HEREDITARY OPTIC ATROPHY.

By Dr. ARNOLD KNAPP.

I HAVE been able to examine the members of three generations of a family suffering from an affection of the optic nerve, which can be regarded as hereditary, and which presents some changes from the usual description[1] of that affection.

The family history is briefly as follows:

J. D. S., sixty-seven years of age, German, emigrated to this country when twelve years old. He does not remember to have had any difficulty with his sight when at school, nor as a soldier during the Civil War. Shortly after the close of the war, when he was twenty-four years of age, he noticed that in driving a truck he could no longer distinguish the street signs. His sight slowly diminished so that he could not read, but during the last ten years it had so much improved that he can again read with the aid of glasses. There were no other cases of defective vision, neither in his parents, who were not consanguine, nor in his brothers and sisters. He has had eight children; three of these died; their sight was normal. Of the remaining two boys and three girls, all have poor sight except one girl. The defective vision was noted when they began to go to school. One of the girls with affected vision married her first cousin. They had six children, of which one died at the age of four with normal sight as far as was noted. Of the other five, four boys and one girl, three boys showed defective sight when they began to go to school.

Of this family I was able to examine the grandfather, his daughter, and her children.

The grandfather, J. D. S., sixty-seven years: V = $\frac{10}{200}$ each,

[1] Leber, *Graefe-Saemisch*, 1st ed., vol. v. Habershon, *Trans. Ophth. Society United Kingdom*, vol. viii.

R>L. Pupils normal. Has used tobacco all his life, but alcohol only rarely. Field: periphery normal. R: central relative scotoma for white, absolute for colors. L: central scotoma for white and colors. Optic discs: the temporal half is atrophic, the nasal half discolored and ill-defined.

The daughter, D. S., thirty-three years old. Defective vision was noted when she began to attend school. V = $\frac{20}{200}$ each. Pupils normal. Field: concentric contraction; 30° out, 10°–15° up, in and down. No color perception. No scotoma. The optic nerves are atrophic, especially in temporal half. She married her first cousin, whose eyes were normal, and three of her six children have poor sight. These are Henry, twelve years old; John, ten years old; and Willie, eight years old. Their poor vision was detected on beginning school. The conditions in the three are alike. The vision is $\frac{20}{200}$. Pupils normal. The field is concentrically contracted: 20° out, 10° up, in and down. No color perception. The optic discs show pronounced atrophy of the temporal half; the nasal half is pale and ill-defined. The children are otherwise perfectly healthy. The intellect is normal, the head not large, and there is no history of convulsions.

The grandfather's vision became affected when he was between twenty and thirty years old. His functional examination reveals the conditions usually described in hereditary optic atrophy, *i. e.*, central scotoma with normal peripheric field. The ophthalmoscope shows the results of a retrobulbar neuritis, marked temporal atrophy. A cause for this condition cannot be found. A toxic amblyopia coming on gradually, due to tobacco, in a young man of twenty-four, does not agree with our knowledge of this affection. Four of his eight children were affected with poor sight, which was detected when they began to attend school. Two boys and two girls were affected; they were otherwise perfectly healthy. The affection was transmitted by only one of these, a girl, to her children. She had six children; three were affected, and all boys. The poor sight became manifest early in life. The ocular conditions in the daughter and grandchildren, the second and third generations, differed from those in the grandfather. The field was concentrically contracted, no color perception, but no central scotoma; the optic nerves showed the same changes: a partial atrophy of the optic nerves, most marked in the temporal quadrant, without well-defined margins, and no changes in the blood-vessels.

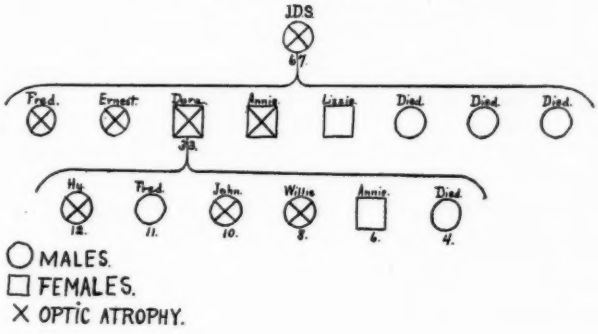
The peculiarities of these cases are:

1. The variation in the manner of optic-nerve affection. A central scotoma with normal periphery of field in the first generation, and a peripherically contracted field with no scotoma in the second and third generations.

2. The early manifestation of the ocular disturbances in the second and third generations. The visual defect was noted at about the sixth year, when the children began to attend school. It may of course have existed from birth. It is stated that the central scotoma may make its appearance later in life, but in the daughter (the second generation) no scotoma has appeared up to her present age of thirty-three.

3. Absence of immunity of female members. Transmission usually takes place through the mother, who is, however, free from ocular defects, though she was affected in our cases.

OPTIC ATROPHY—FAMILY TREE.



SEVERE PSEUDO-MEMBRANOUS CONJUNCTIVITIS IN AN INFANT PRESUMABLY DUE TO THE INFLUENZA BACILLUS.

By ARNOLD KNAPP, M.D.

C. B., six weeks old, healthy child of Italian parents, was brought to the Vanderbilt Clinic on March 16, 1904, with the statement that the eyes had been inflamed for ten days. The child was well developed, no fever, had taken its food well, and had not been ill. One other child is alive and healthy, one died at the age of two weeks.

On examination, the lids are moderately swollen, red, and closed. On everting the lids of the right eye, the tarsal conjunctiva is infiltrated and covered with a non-adherent thin fibrinous membrane. There is some thin yellowish discharge. The retrotarsal folds are swollen, red, and irregularly hypertrophied. No follicles. The bulbar conjunctiva is but little involved. The cornea is diffusely hazy, the superficial epithelium is intact. The left eye presents the same changes though to a lesser degree, and only one half of the cornea is hazy.

Course.—The condition during the next two days grew worse, the right cornea became opaque, and a circumscribed yellowish infiltrate formed in the nasal half of the corneal stroma. The overlying epithelium showed an irregular superficial defect. The membranes on the tarsal conjunctiva were continuously reformed. The discharge remained thin and watery, and gradually became less, but was never purulent in character. The infiltration in the right cornea did not increase. Blood-vessels made their appearance in the periphery of the right cornea. The infiltration contracted, though it became somewhat more yellow. The formation of membranes and the discharge gradually ceased, and on March 26th the eyes were kept open. On

March 28th the mother insisted upon taking the child home, and we did not see it again until April 8th. The conjunctivæ then had almost returned to their normal condition. The right cornea was opaque and vascularized. A small black spot marked the site of a perforation in the area of the recent infiltration. The left cornea had completely cleared up.

Treatment.—Frequent irrigations with sublamin, 1:3,000; protargol, 5 %, t. i. d., and cold compresses. Later silver nitrate 1 % daily; hot compresses and atropin.

Bacteriological Examination.—The first cover-glass specimens stained by the ordinary method gave no bacteria. On the third day a smear stained with diluted carbol-fuchsin gave short bacilli. The conjunctival discharge planted on agar showed, after forty-eight hours in the thermostat, a number of small round and several larger colonies. The larger colonies were due to the xerosis bacillus. The small colonies were composed of very short bacilli with rounded ends. Transplants were made on hemaglobin agar, serum agar (ascitic fluid), and ordinary agar. A growth was obtained only on the first. The colonies presented the minute, non-confluent, dew-drop type characteristic of the influenza bacillus. The organism has been kept growing only on hemaglobin agar by frequent transplantation. Control transplants on serum agar always remained sterile. The morphology of the later generations shows no changes and very few threads. The organism was non-pathogenic for rabbits.

This organism morphologically and culturally belongs to the influenza group. As the other organism present, the xerosis bacillus, has no pathogenic importance, it may be safely presumed that this influenza-like organism has etiological significance. The scanty growth on the original agar medium does not invalidate the exclusive dependence on a hemaglobin-containing medium characteristic for the influenza bacillus as sufficient of the fibrinous conjunctival discharge was implanted to supply the necessary addition for its growth. The morphology and non-growth on serum agar exclude the Koch-Weeks bacillus. To distinguish between the true influenza bacillus and the pseudo-influenza bacillus, it is stated that the latter organism is larger and broader, and in subsequent generations changes to involution forms (Scheinfäden). Animal experimentation is not conclusive. Clinically our little patient presented no features of influenza. Infections with the pseudo-influenza bacillus have, however, been frequently observed in infants (broncho-pneumonia, otitis).

The clinical course of the conjunctivitis was characterized by the pseudo-membranes, the thin fibrinous discharge, and the corneal involvement which led in one eye to perforation. Pseudo-membranes can occur, as is well known, in all infections of the conjunctiva; the milder forms being usually associated with the Koch-Weeks bacillus, the pneumococcus, and the gonococcus. Pseudo-membranes associated with the influenza bacillus have not previously been noted. A number of cases of influenzal conjunctivitis have been reported (Zur Nedden,[1] Jundell,[2] Morax).[3] The cases have clinically, however, been characterized by a mild course. In Jundell's cases the conjunctivitis occurred in a general influenzal infection; the bacillus was found not only in the conjunctival discharge, but in the sputum. In all of the cases the conjunctivitis was mild except in one where the inflammation was severe and purulent in character. In Zur Nedden's publication (l. c.) the palpebral conjunctiva and retrotarsal folds were always found chiefly affected and no tendency to corneal involvement was present. In eight of thirteen cases other manifestations of influenza were present. As this author remarks, it is striking that all cases have occurred in the first years of life. Müller has found an influenza-like organism in trachoma and only in this disease, so that he is inclined to regard it of etiological importance in trachoma. I have also found this bacillus in trachoma cases, and shall return to this question in a subsequent paper. It is quite evident that the above case was not one of trachoma.

This case is unusual as showing that a severe conjunctivitis with pseudo-membranes and corneal involvement in an infant was caused by a bacillus, which from our present knowledge must be regarded as the influenza bacillus. There were no other manifestations of influenza. The conjunctivitis occurred during a time of the year when influenzal infections were present in New York.

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[1] Zur Nedden, "Ueber Influenzabacillen conjunctivitis." *Klin. Monatsbl. f. Augenheilk.*, vol. xli., p. 218.

[2] Jundell, "Influenza conjunctivitis bei Säuglingen." *Mitteilungen aus d. Augenklinik in Stockholm* (Wittmark), vol. iii., 1902, p. 11.

[3] Morax, *Annales d'ocul.*, vol. cxxix., 1903, p. 156.

PARINAUD'S CONJUNCTIVITIS.

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(*With two figures on Text-Plate XVII.*)

PARINAUD,[1] in 1889, described a rare form of conjunctivitis associated with the formation of small conjunctival vegetations and enlargement of the pre-auricular gland, which he regarded as due to some infectious agent transferred from animals to man. The affection, says Parinaud, differs from all other forms of conjunctivitis, but resembles at first a granular conjunctivitis. It is characterized by red or yellowish vegetations, at first semi-transparent, later opaque, which can attain the size of the head of a large pin. Between these large vegetations are small yellow granules which call to mind tuberculosis of the conjunctiva. These growths are situated in the retrotarsal folds, on the tarsus or globe; the cornea is unaffected. There are mucous secretion and fibrinous deposits, but no suppuration. The eyelids are swollen, hard to the touch, and present irregular nodules to the examining finger as though chalazia were present. Meanwhile the parotid region becomes the seat of a puffiness which sometimes extends down the neck; one can feel enlarged glands sometimes softened; the patient

suffers from fever and irregular chills. After a few weeks the œdema of the parotid region disappears; the glands may subside or they may suppurate. The duration of the process is apt to be long and may occupy six months.

Since Parinaud's original communication, a number of similar cases have been reported, and four important papers on the subject have appeared. Sans,[3] in 1890, contributed three cases from Abadie's clinic. Dominique[3] in 1897 collected three more, and Gifford[4] in 1898 reported five from his own practice (one is doubtful). Very recently Chaillous[5] has published a rather exhaustive article giving five cases of his own and two observed by colleagues. In spite of this, however, the disease has been mentioned in only the most recent text-books on ophthalmology, and it seems entirely to have escaped attention outside of France and America. It is probable that Fuchs[6] was familiar with this affection, although he was unacquainted with the observations of Parinaud. He speaks of seeing several cases with conjunctival ulcers of acute origin, accompanied by a severe inflammation with swelling of lids and pre-auricular gland. As possible causes, he suggests external infection by the sting of an insect, by an infected foreign body, or through contact with some toxine. Comparatively little scientific investigation has been carried out in connection with it, and its etiology is as much in the dark now as it was when the disease was first described, fifteen years ago. It has seemed well, therefore, to report the following additional case, and to collect and analyse as far as possible all of the cases hitherto reported.

On January 24, 1904, F. R., a stenographer, aged thirty, white, presented herself at the out-patient clinic of the Infirmary, service of Dr. F. M. Spalding, who made the diagnosis of Parinaud's conjunctivitis and kindly referred the case to the writers for observation and treatment. The following history was obtained: Patient states that for the past ten days her right upper lid had been swollen and the eye red. The swelling came on slowly, was not painful, and was accompanied by no discharge from the eye. During the same period she has noticed a painless swelling in front of her right ear. She complains of not being

able to see well on account of drooping of the lid; also that when she looks up and out there is a scratching sensation on the eye. Her general health has always been good, and she has noticed no change in it lately. Has not been exposed to persons with sore eyes, and has not come in contact with horses, dogs, cats, etc. Examination shows the right upper lid red and swollen, especially the lid border, the skin of which is tense and shiny. No tenderness on pressure, except just below the outer part of the supraorbital ridge. The cornea is perfectly clear. The bulbar conjunctiva, lower lid, and lower fornix are injected, but otherwise normal. Eversion of the upper lid and exposure of the fornix show the latter to be red and œdematous and the seat of polypoid outgrowths. Some of these are pale, others red. An especially large one is situated at the outer part, the tender area. Between the projections are many small reddish granules resembling enlarged lymph follicles. On the tarsus there are no polypoid growths, and only one distinct granule can be seen. There is no evidence of ulceration. The pre-auricular gland on the right side is considerably enlarged and slightly tender. No glands in the neck or on the left side of the face are to be felt. Left eye normal.

The large polypoid growth was excised, argyrol, 25 % solution, was ordered to be instilled into the eye thrice daily, and hot fomentations applied. The outward appearance of the eye did not change much during the three weeks following, but the glandular swelling increased and the retromaxillary glands became involved. All of the glands finally became matted together, producing a very noticeable enlargement on that side of the face, associated with increased tenderness, considerable puffiness, and hyperæmia of the overlying skin. Coincident with the enlargement of the glands there was an increase in the size and number of outgrowths in the fornix, some of which took on a slightly yellowish tint as they grew larger. The argyrol was discontinued as it seemed to increase the swelling of the lid, a mild wash of corrosive sublimate given instead, and as the outgrowths became larger they were excised. Ichthyol ointment was applied externally to the swollen glands, liquor potassii arsenitis, m. viii. t. i. d., was administered internally. After three weeks the process began to retrograde, the vegetations ceased forming, the lid returned to nearly natural size, and the glands subsided without ever showing fluctuation. Breaking down of the granules in the

fornix with the formation of ulcers was at no time observed. The subjective symptoms were always slight, and the patient's health did not suffer. A thorough medical examination, made early in the course of the disease, gave nothing of note. Three months after the patient was first seen the eye was practically well; the scars in the fornix resulting from the excisions were visible, but had produced no apparent cicatricial contraction. There was still a slight degree of ptosis, and some induration in front of the right ear.

Examination for Micro-Organisms.—Smears and cultures made from the conjunctival secretion showed the xerosis bacillus and occasionally the staphylococcus albus. Both aërobic and anaërobic cultures were taken upon coagulated ox-blood serum, also upon agar-agar to which fresh human blood had been added. Smears and cultures taken from the polypoid growths were always negative. One bit of the tissue was allowed to remain in a blood-serum tube forty-eight hours, then embedded and sectioned, but no micro-organisms could be found in it. Two other pieces allowed to remain one month in the incubator upon fresh human blood, one of the tubes being made anaërobic, gave negative results on microscopic examination. Teased preparations from the polypoid growths, examined fresh with special reference to the presence of bacteria and other micro-organisms, also gave negative results. Sections of the tissue, fixed and stained as mentioned below, were unsuccessfully searched for bacteria, fungi, and protozoa. The carbol-fuchsin and gentian-violet stains showed a number of minute dots in and among the necrotic cells, which possibly may have been cocci, but they were regarded as products of degeneration.

Animal Inoculation.—A piece of one of the polypoid growths was introduced into the eye of a rabbit. Considerable trauma was produced by the animal making a sudden jerk, and in consequence the eye was somewhat inflamed for two days. The bit of tissue, which adhered to the pupillary margin of the iris, was completely absorbed in the course of four weeks without otherwise causing any reaction. A second bit of tissue, introduced subcutaneously into the groin of a guinea-pig, was also absorbed without incident.

Histological Examination (Figs. 1 and 2).—Some of the pieces of tissue, excised from time to time from the conjunctival sulcus, were fixed in alcohol, others in 10 % formalin, and the rest in

TO ILLUSTRATE DRS. VERHOEFF AND DERBY'S PAPER ON PARINAUD'S CONJUNCTIVITIS.

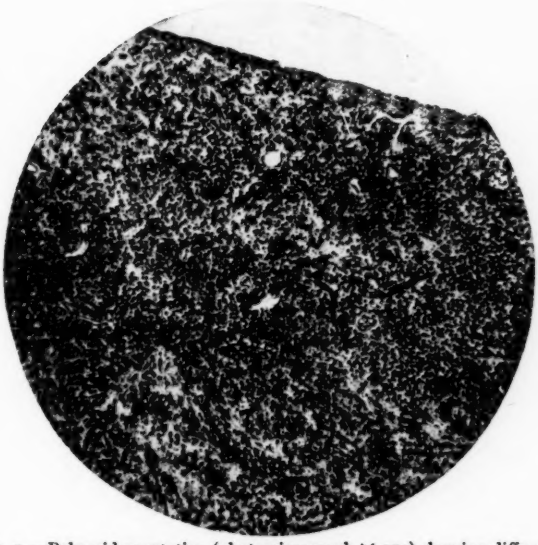

FIG. 1.—Polypoid vegetation (photomicrograph × 129) showing diffuse character of cellular infiltration.

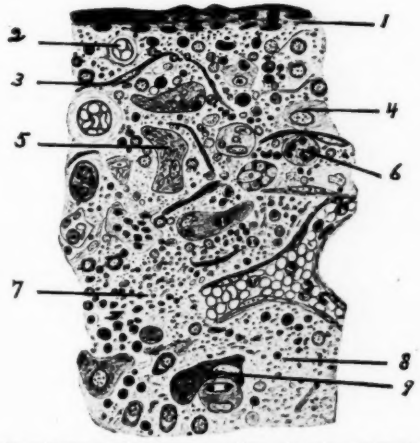

FIG. 2.—Polypoid vegetation (hematoxylin and eosin, Zeiss obj. D D oc. No. 4). 1, surface epithelium; 2, blood-vessel; 3, connective-tissue cells; 4, 5, 6, phagocytic epithelioid cells; 7, 8, areas of cell necrosis; 9, phagocyte in the act of enclosing another. The lymphoid and plasma cells will be readily recognized. Note the complete abscence of pus cells. Mallory's connective-tissue stain brings out more connective tissue than is here shown.

Zenker's fluid. The latter gave by far the most satisfactory results, as after the other two fixatives the cells and nuclei were shrunken and distorted. Both paraffin and celloidin embedding was employed, the sections by the former method being cut one micron, and by the latter four microns in thickness. Sections were stained in hematoxylin and eosin, Van Giesen's stain, Mallory's connective-tissue stain, Mallory's phosphotungstic acid hematoxylin, Gram-Weigert stain, Haidenhain's iron hematoxylin, carbol-fuchsin, gentian-violet, the stain for the tubercle bacillus, thionin, and in a number of other ways.

On microscopic examination all of the specimens show the same changes. The polypoid growths are found to be made up of newly organized tissue richly infiltrated with cells, which replaces the subconjunctival tissue. While it is, perhaps, strictly correct to speak of the new formation as granulation tissue, to do so may give an incorrect idea of its true nature, for it differs strikingly from ordinary granulation tissue in containing almost no pus cells. In the more superficial portions of the growth, the cellular infiltration consists almost exclusively of lymphocytes and epithelioid cells, with here and there a plasma cell. The lymphocytes are often large, but there are few if any of the "mother cells" which are so frequent in trachoma. The epithelioid cells predominate here and there, and are usually irregular in shape, occasionally round but never spindle-shaped. They are highly phagocytic, most of them containing necrotic nuclei and other cellular detritus, and not infrequently one of them may be seen in the act of enclosing another cell. Often they are full of vacuoles. They do not resemble the fibroblasts of granulation tissue, but seem to be identical with the epithelioid cells found in the intestinal lesions of typhoid fever, and like the latter cells are no doubt of endothelial origin. The larger proportion of the infiltrating cells, including the epithelioid cells, show marked degenerative changes, varying from simple karyolysis and fragmentation of nuclei to more or less complete disintegration of the cell bodies. Owing to the extensive necrosis, the comparatively normal cells are incorporated in a mass of detritus. In fact there are many relatively large areas composed entirely of the latter. The connective-tissue stains show numerous capillaries and delicate fibrillæ extending in among the cells and reaching the epithelium. Deeper down the connective tissue becomes denser and assumes more and more the appearance of

normal tissue, while the character of the cellular infiltration is much changed, the latter consisting almost entirely of plasma cells with only a few lymphocytes. Fibroblasts are of course frequent. There are also many eosinophiles and, as shown by staining with thionin, a considerable number of mast cells. The deeper tissue thus shows for the most part simply a chronic inflammatory reaction. There are occasionally, however, even here, small focal areas and dilated lymph spaces containing phagocytic epithelioid cells, necrotic cells, and detritus.

The epithelium over the growths is reduced in thickness and shows no tendency to send interpapillary downgrowths into the underlying tissue. Some of the epithelial cells contain cell inclusions. Elsewhere the epithelium shows many goblet cells and the ordinary signs of chronic inflammation. The subconjunctival tissue in the vicinity of the polypoid masses is densely infiltrated with plasma and lymphoid cells, and shows an occasional epithelioid cell, but nowhere is the appearance of enlarged lymph follicles produced such as is seen in trachoma. On the contrary, the granules in this disease seem to be of the same nature as the polypoid vegetations, simply representing an earlier stage of the process.

To sum up the microscopic findings in a few words: the lesion consists essentially of marked cell necrosis in the subconjunctival tissue with extensive infiltration of the latter with lymphoid and phagocytic epithelioid cells. This is accompanied by chronic inflammatory reaction of the deeper tissue, leading to the process of organization and the production of new fibrous tissue.

Remarks.

That this case belonged to the class of cases described by Parinaud is plain. The monocular character of the affection, the moderate conjunctival secretion, the occurrence of the vegetations in the fornix, the painful inflammatory enlargement of the preauricular and retromaxillary glands, the long duration, and lastly, the final subsidence of the process without evil consequences, leave no doubt of the diagnosis. Tuberculosis was excluded by the bacteriological and histological examinations, and by the negative results of animal inoculation, to say nothing of the clinical course of the disease. From trachoma the affection was distin-

guished by the clinical picture, the mild course, the glandular enlargement, the absence of corneal involvement, and, above all, by the histological findings.

The writers have been able to collect from the literature the following twenty-two cases which they believe to be cases of Parinaud's conjunctivitis. A few other cases, thought by some observers to be of this nature, will be referred to later.

CASE 1 (Parinaud [1]).—Female, thirty-four. Right upper lid swollen for last ten days. Increased secretion. Swelling on right cheek of about three days' duration. Examination, upper lid swollen and red. On the tarsus ten granulations, some yellow, some red, half-transparent, the largest three times as large as the head of a pin and prominent. One shallow erosion. Vegetations in the fornix. Preauricular gland the size of an almond. Neighboring parts swollen and red. Duration of process four months. Abscess of preauricular gland developed.

CASE 2 (Parinaud [1]).—Female, twenty-four. Swelling and redness of left eye. Nearly whole conjunctiva is the seat of granules, red or yellow, semi-transparent. Some nearly the size of a pea. Caruncle involved. A little serous œdema and secretion. Considerable glandular enlargement extending down into clavicular triangle with swelling and redness of skin. Pain slight, but glands are tender. Swelling of the glands took place one week after ocular symptoms began. After six weeks, conjunctival symptoms began to disappear. Abscess of glands. Duration three months; no trace left on conjunctiva.

CASE 3 (Parinaud [1]).—Male, four years. Three weeks previously a painful tumor developed in front of left ear. One week later swelling of left lids with redness and secretion of the eye. There is a hard, tender swelling of parotid region, the lids are red and swollen irregularly as though chalazia were present. Preauricular gland enlarged and softened. Over almost the whole conjunctiva are reddish vegetations and between them small yellow granules. No ulceration. O D normal. A little fever. Gland aspirated and pus withdrawn. No change in two months and then lost sight of.

CASE 4 (Sans [2]).—Female, twenty-two. For two weeks the right upper lid has been swollen. Headache and fever. Palpebral conjunctiva presents large granulations and small yellow

points. Bulbar conjunctiva injected and œdematous. Cornea intact. Preauricular gland swollen and painful, retromaxillary and cervical glands can be palpated. Overlying skin red and puffy. Slight febrile symptoms. Granules excised and cauterized. In six weeks the patient was discharged well with no trace of the condition remaining on the conjunctiva. No glandular suppuration.

CASE 5 (Sans [2]).—Male, twenty-five years. One week previously, while clipping the leg of a sick horse, a foreign body (supposed to be a hair) flew in his right eye. Two days later the upper lid was swollen and the conjunctiva red. Swelling increased, the preauricular gland became enlarged, and the overlying skin œdematous. Examination: Swelling and hardness of right upper lid, injection of the conjunctiva and small areas of infiltration in the cornea. Eversion of the lids shows red, irregular elevations resembling granulations slightly. After ten days' treatment the eye was normal except for a few slight corneal infiltrates. Four months later he had a pustular keratitis in the same eye.

CASE 6 (Sans [2]).—Female, seventeen years. Two months ago O D became inflamed, followed in two days by swelling of the preauricular and parotid glands and puffiness of the overlying skin. Two weeks later an abscess of the preauricular region was opened. Examination: Considerable swelling of right upper lid. Conjunctiva inflamed. Button-like elevations, more or less red, some surmounted by small yellow points. Well-marked furrows between the elevations. Bulbar conjunctiva and cornea intact. In one month the vegetations began to disappear, and as glandular swelling persisted she was transferred to the surgeon. During convalescence she had facial erysipelas. Seven months later her conjunctiva showed no trace of the process.

CASE 7 (Kalt [7]).—Female, fifty-three. Two weeks ago, while taking care of a child affected with broncho-pneumonia, she noticed a swelling of her right lids with enlargement of the glands in front of her ear. Right eye presents the appearance of acute catarrh with intense palpebral swelling. Conjunctiva chemotic, cornea and iris intact. In the middle of upper tarsus are fungus growths and an ulceration covered with a grayish membrane. Hypertrophy of the conjunctival follicles looking like trachoma or vernal catarrh. Swelling of preauricular and lower retromaxillary glands. Considerable fever in the evening. Treat-

ment: Lavage with potassium permanganate and later excision of the granules. In three weeks the preauricular gland broke down and was opened. Discharged well in seven weeks.

(NOTE.—It is possible that there was an acute conjunctivitis coexisting with the other process.)

CASE 8 (Parinaud[8]).—Female. About ten days before, right eye became injected and began to discharge. No pain. Coincident enlargement of the preauricular gland. Fever and slight chills two days previously. Internal part of upper tarsus covered with large, red, semi-transparent granulations, which extend into the upper fornix. Three large granulations on lower tarsus and smaller ones in the lower fornix. Bulbar conjunctiva markedly injected. Marked swelling in parotid region without redness of the skin. The preauricular gland is enlarged to the size of an almond, and feels fluctuant but is not tender. Enlarged gland at angle of jaw. Slow improvement. No glandular abscess. Patient discharged at the end of six weeks.

CASE 9 (Despagnet[9]).—Male, ten years. Right eye inflamed and lids swollen for two weeks. Synchronous enlargement of the preauricular and cervical glands with reddening and tenderness of the overlying skin. Child feverish and depressed. Examination: Right lids œdematous, red, and hard to the touch. No photophobia. Secretion scant. Serous chemosis. Cornea normal. Reddish granules in the lower conjunctiva. On the upper tarsus red granules and yellow areas. Cauliflower-like excrescences in the fornix with many yellowish areas. Œdematous swelling in parotid region and neck. Exacerbations of fever every evening. One of the yellow areas excised and a drop of purulent fluid obtained. Treatment with silver nitrate aggravated the condition. Child discharged well in two and a half weeks.

CASE 10 (Gifford[4]).—Male, forty-three years. Three weeks before, O D began to swell and discharge after getting dust in the eye. Glands of the neck soon became swollen. Examination: Right upper lid œdematous and drooping. Conjunctival surface of the tarsus and retrotarsal folds are covered with large rounded granules with several superficial patches of ulceration. Cornea clear, discharge moderate, little irritation. Right preauricular and retromaxillary glands are much swollen. O S and glands normal. Slow improvement. No suppuration of glands.

Lost sight of in three weeks but seen again after seven years when there was a slight atrophic appearance of the conjunctiva and the upper lid drooped slightly.

Case 11 (Gifford [4]).—Female, seven years. Began to have trouble with the left eye six months ago. Symptoms increased in last two weeks. Examination: O D normal. O S retrotarsal folds above and below are studded thickly with polypoid granulations, most of them somewhat pedunculated. Surface of granulations rough and covered with a scanty, tenacious discharge. No ulcerations. One large granulation on lower tarsus. Glands of parotid region and along posterior border of sternomastoid muscle markedly swollen. On right side a slight enlargement of cervical glands. Treatment: Granulations trimmed off and child was practically well in ten days. No suppuration.

Case 12 (Gifford [4]).—Male, thirty-eight years. Two weeks ago the left upper lid became tender and within twenty-four hours the glands of the face and neck became swollen and the eye discharged freely. Examination: O D normal. O S, upper retrotarsal fold much swollen and coarsely rough with three large fungiform granulations, one just outside the centre $\frac{1}{8}$ inch in diameter. In the centre of the retrotarsal fold is an elevated ulcerated area about $\frac{1}{4}$ inch in diameter with much thickened borders of granulation tissue. Surface of ulcer uneven and gray. Cornea clear, secretion moderate, subjective symptoms almost lacking. Preauricular and retromaxillary glands, on the left side only, much swollen and tender. In ten days the eye was nearly well. No glandular suppuration.

Case 13 (Gifford [4]).—Male, twenty-five years. Two weeks ago O D began to discharge and the lids became swollen. In three days the swelling was extreme and then declined somewhat. Glands of face and neck then became swollen. Examination: O S normal. O D moderate discharge. Both retrotarsal folds swollen, granular, and studded with small superficial ulcers covered with grayish secretion; two of these ulcers are on the tarsus and a few on the bulbar conjunctiva, one just above the cornea. Cornea normal; irritation slight. Preauricular glands and those behind and below the jaw, on the right side only, immensely swollen and somewhat tender. The author heard indirectly that the case got entirely well in the course of a few weeks. Not known whether the glands suppurated.

Case 14 (Miller [19]).—Male, twelve years. Three days before,

was struck in the right eye. The lids immediately swelled, the glands of the face and neck became enlarged, and the eye discharged freely. Examination: O S normal. O D lids œdematous and red. Preauricular gland and those under the angle of the jaw swollen, red, and exquisitely tender. Bulbar conjunctiva moderately injected. Cornea, normal. Retrotarsal folds, especially the upper, very much thickened and congested. On upper tarsus four well-marked abscesses or pustules 2 to 5*mm* in diameter, of a grayish yellow color, very tender, and emitting a drop of thin pus on incision. The ulcers which followed were irregularly cut with considerable granulation tissue. Conjunctiva œdematous and almost granular. On the lower tarsus, smaller pustules. The glands did not suppurate, and healing took place in three weeks. Incidentally the patient had a severe attack of tonsillitis.

Case 15 (E. R. Wylie[11]).—Male, aged thirty-two. Inflammation of O S for ten days past; also a lump under the jaw on the same side. O D normal. O S lids much swollen. Conjunctiva of lower lid presents a finely granular appearance with several large granulations. Conjunctiva of upper lid smooth, œdematous, and bleeds easily. Quite profuse discharge but no pain. During next few days the upper retrotarsal fold enlarged to such an extent that it passed over the cornea. Between the granulations were many superficial ulcers. Later the retromaxillary and submaxillary glands became enlarged and the whole side of the face was swollen. Chills and fever. Improvement three and a half months after the onset, and at the end of five months the conjunctiva was normal and there was only a slight ptosis. The submaxillary gland suppurated.

Case 16 (Jocqs[12]).—Male, nine years. Three months previously, phlegmonous swelling of right preauricular gland. Suppuration. Incision. Feverish condition. A few days later, a painful swelling of the submaxillary glands, and at the same time swelling of right upper lid with moderate secretion. Examination: Slight secretion and ptosis. Swelling of external part of upper lid as if a chalazion were there. Upper tarsus and culde-sac covered with small granulations. In the external part of the superior border of tarsus are irregular vegetations. Touched with galvano-cautery and with copper sulphate. Duration of process, two months.

Case 17 (Chaillous[8]).—Female, forty-one years. For three

weeks, pricking and itching of left eye without secretion. After two weeks swelling of the lids and of the preauricular and lower retromaxillary glands. Examination: Considerable swelling of left upper lid. Moderate secretion. Bulbar conjunctiva swollen and injected. In the upper cul-de-sac the conjunctiva is fluffy and irregular and covered with little white points like the head of a pin. No real vegetations. Two small erosions. Preauricular region swollen down to angle of jaw, and in one place the enlarged glands are slightly tender. Subjective symptoms slight except for general malaise. Cauterization of erosions. Duration between three and six months. No suppuration.

Case 18 (Chaillous and Toufesco[5]).—Male, sixteen years. Three days ago, his left eye became red and the upper lid swollen. Examination: Considerable swelling of the lids. In the upper cul-de-sac are numerous opalescent, rounded projections, which are also present on the tarsus. Swelling and tenderness of the preauricular gland, with œdema and redness of the skin. Retromaxillary glands also swollen. Epitrochlear, axillary, and inguinal glands also swollen, but hard and not tender. Abscess of the left forearm. On the next day, the right eye was found to be affected, and here the lesions extended to the bulbar conjunctiva. The right preauricular gland was swollen and it was excised. The patient had a nasal catarrh and adenoids. Seen again after five months, at which time the inflammation was gone, but the upper tarsus on both sides showed papillary hypertrophy resembling vernal catarrh.

Case 19 (Roche[19]).—Female, fifty-five years. Two weeks before, right (left ?), eyelids became swollen. Then swelling of the preauricular gland of the right side (left side ?). Examination: Œdema of the eyelids and considerable chemosis. Subjective symptoms slight. Palpebral conjunctiva and that of the fornices swollen and covered with papillæ. The preauricular and lower retromaxillary glands on the left side are swollen. In twenty-four days after the first examination the lesions had disappeared from the left eye and the right eye became affected, showing the same papillary hypertrophy. No glandular swelling on that side. Duration unknown. It was found that in the commune where the patient lived there was an epidemic of foot-and-mouth disease.

Case 20 (Chaillous[4]).—Male, two years. Five days previously, redness of right eye and swelling of the eyelids. Feverish. Ex-

amination: Lids swollen and stuck together. Slight secretion. On the caruncle and semilunar fold and lower palpebral conjunctiva are pale projections and small red granulations. Preauricular, retromaxillary, and cervical glands on the right side swollen and painful. Left side normal. The child did not return. It was learned that the eye remained swollen for some weeks.

CASE 21 (Chaillous[9]).—Female, fifty-nine years. About one month before, chills and malaise. Ten days later, pricking sensation in O D, with slight redness, secretion, and swelling of the lids. Examination: Right upper lid swollen; conjunctiva chemotic. Lower palpebral conjunctiva covered with granulations, some larger than others; a few whitish areas. Preauricular glands swollen and tender. Malaise, fatigue, chills, and fever. Goes into the country frequently where foot-and-mouth disease is endemic. Duration three months. No glandular suppuration.

CASE 22 (Chaillous[8]).—Male, thirteen years. Two weeks previously, swelling of left upper lid. One week later, swelling of left cheek, with pain, tenderness, and fever. Examination: Left lids œdematous. Projecting vegetation of upper fornix hanging down over the cornea, irregular in outline, resembling a raspberry, pedunculated. Slight papillary hypertrophy. Swelling and tenderness of the preauricular, retromaxillary, and cervical glands on the left side, with reddening of the skin. Right eye normal. Vegetation excised. Duration two months. No glandular suppuration.

In the above list the cases of Goldzieher, [11] stated by Gifford to be cases of Parinaud's conjunctivitis, have not been included, and that of Greeff [10] has also been left out. Goldzieher regarded his cases as unusual instances of lymphoid hypertrophy of the conjunctiva, while Greeff called his case "pseudo-trachoma." It is true that these cases present a symptom-complex which in many points resembles the disease under consideration, yet it seems to the writers that they may be differentiated with certainty from Parinaud's conjunctivitis. Goldzieher speaks of the retrotarsal folds springing forward in gigantic hyperæmic folds, like a cockscomb, a description that calls vividly to mind the not uncommon cases of adenoid hypertrophy of the conjunctiva in children, and it is to be noted that at least two of the

cases in question occurred in children not over fourteen years of age. These children may also show swollen tonsils, adenoids of the naso-pharynx, and enlarged glands elsewhere. Both eyes are generally affected, it is true, but not always to the same extent, and the writers can recall several cases where the amount of hypertrophy in one eye was insignificant. In Parinaud's conjunctivitis ulceration occurs in nearly half of the cases, whereas no mention of it is made by Goldzieher or Greeff. Then again the glandular swelling described by the latter observers was not characteristic. To be sure there was sudden enlargement of considerable degree, but nowhere was there mention of tenderness, reddening, and puffiness of the overlying skin with a tendency of the glands to break down. Lastly, Goldzieher and Greeff found on microscopic examination always the typical picture of lymphoid hypertrophy, which can in no way be confounded with the granulation tissue described by Gifford, Wylie, Chaillous, and the writers. There is no reason, therefore, to differ with Goldzieher in regard to the nature of his own cases, and Greeff's case unquestionably belongs in the same category.

One of Gifford's cases is also not included in the list because the diagnosis was too uncertain. Neither the preauricular nor submaxillary glands were affected, only a few cervical glands being enlarged. The case was followed for a short time only and the final outcome was not ascertained. Here it is impossible to exclude tuberculosis.*

The case of Rohmer,[16] in which both eyes were affected, deserves to be mentioned, since it was reported as a case of Parinaud's conjunctivitis. The patient was a man, aged twenty-five, who presented symptoms of a severe conjunctivitis, with photophobia, lachrymation, conjunctival injection, and swelling of the lids. There was pannus of both corneæ with a slight opacity of the right. The conjunctiva showed numerous granules not characteristic of trachoma. There were large masses of glands on each side of the neck

* The case reported by Darier[17] as Parinaud's conjunctivitis, in which the subsequent pathological examination by Morax and Massoulian[18] showed many tubercle bacilli, illustrates how readily the clinical aspect of this disease may be confounded with that of tuberculosis.

of eighteen months' duration. The end result of this case is not known. The duration and location of the glandular swelling, the involvement of the corneæ, and the protracted course of the affection make it altogether improbable that this was a case of Parinaud's conjunctivitis.

ANALYSIS OF CASES.

Climate.—The French cases, sixteen in number, all came from the northern half of France, so far as can be learned. Of the seven American cases, four occurred in Kansas, one in Iowa, and two in Massachusetts. Thus up to the present time the disease has been observed only in the temperate zone and in climates not differing to any marked extent.

Season.—Six cases developed the disease in October, four in November; two each in September, January, June, and July; one each in February, April, May, and December. In one case the month was not given. Autumn seems, therefore, to present the most favorable conditions, having twelve cases as against ten during the rest of the year.

Sex.—The sexes are affected equally often. In the list there are twelve males and eleven females.

Age.—The oldest patient was fifty-nine years of age, the youngest was two. Sixteen cases were under and six over thirty-six.

Eye Affected.—Fourteen times the right eye, seven times the left, and twice both eyes were affected. Thus the disease is unilateral in a large majority of the cases.

Symptoms and Signs.—The subjective symptoms due to the eye alone were always moderate. Swelling of the lid, as at the onset of an acute conjunctivitis, was a constant symptom, occurring in all cases. More commonly the upper lid alone was involved, although not infrequently the lower lid was also affected. Parinaud speaks of an irregular thickening as though chalazia were present, which was no doubt due to the vegetations in the fornix. Ptosis, due at first to œdema of the lid, generally persisted long after the acute stage and was often the last remaining sign of the disease. The bulbar conjunctiva was always hyperæmic and in some cases œdematous. The discharge was usually slight in

amount and muco-purulent in character. The conjunctival lesions were of three kinds, namely: large reddish semi-transparent polypoid vegetations, small yellowish granules, and erosions or superficial ulcers. Of these the vegetations were the most characteristic as they were absent in but two cases (13, 14). They sometimes involved almost the whole retrotarsal fold and hung down over the cornea like a curtain. They were occasionally pedunculated, and at times presented yellowish areas as though there were a drop of pus or necrotic material beneath the surface. The small yellow granules occurred in about half the cases, usually with the large polypoid vegetations, but in Case 14 accompanied only by small ulcers. Ulcers were described in eight cases, and varied from small superficial erosions to an "elevated ulcerated area ¼ inch in diameter with much thickened borders of granulation tissue." The lesions were situated throughout the whole conjunctival sac in several cases, but were generally limited to the tarsus and fornix, the upper fornix being the seat of election. The vegetations occurred, as a rule, in the fornices alone and never on the bulbar conjunctiva, while ulcers and granules were found in all situations. The cornea was affected in only one case (5), and this was a man subject to recurring attacks of keratitis. It is safe to say that Parinaud's conjunctivitis, in itself, does not lead to corneal complications.

The glandular involvement usually took place simultaneously with or soon after the onset of the ocular symptoms; in one case, however, it apparently occurred as early as one week before. The preauricular gland was most often involved and was generally the first to become swollen; following this came the retromaxillary and parotid, the submaxillary and cervical. In Case 14 an acute tonsillitis developed, indicating, perhaps, an extension of the process to the tonsils. As would naturally be supposed, the cervical glands were never affected without other glands nearer the eye also being involved. That the general glandular enlargement, noted in Case 18 by Chaillous, was related in any way to the ocular affection the writers regard as highly improbable.

In seven cases glandular abscesses formed, while in the

remainder (as far as can be ascertained) the latter were absent, showing conclusively that such abscess formation is not a necessary feature of the disease as Parinaud held in his original communication. In the seven cases of glandular abscess, conjunctival ulcers were noted but three times, so that there seems to be no relation between the two. Systemic involvement was mentioned in a majority of the cases and was generally limited to a mild febrile disturbance. Occasionally, however, there was considerable fever, malaise, depression, and even loss of weight. Facial erysipelas developed late in the course of one case. None of the patients showed evidences of tuberculosis or syphilis.

Duration.—This varied considerably. The shortest (5, 9) was two and a half weeks; the longest five months. In the latter case (15) there was a submaxillary abscess which persisted six months longer, making the total duration eleven months.

Bacteriology.—The conjunctival secretion, in the few cases in which it was examined, showed no organisms which could be regarded as specific. Sections of the polypoid vegetations were examined for micro-organisms in only two cases; with negative results in the writers' case, while in Case 16 micrococci were found but were not confirmed by cultures. Pieces of conjunctival tissue were introduced into the anterior chamber of a rabbit's eye on four occasions (the writers' case, and Cases 8, 18, and 22) but produced no lesions. In three cases (writers' case and Cases 18 and 22) similar pieces of tissue were introduced into the abdominal walls of guinea-pigs with negative results. In one of these cases (18) the nasal mucous membranes of young pigs were inoculated but without result. The latter animals are very susceptible to foot-and-mouth disease, and the experiments were made in an attempt to support Parinaud's view that this disease is the source of the conjunctival affection in man. Material from the affected glands was examined in three cases. In two cases (3 and 18) the results were negative. In Case 15, where the material was injected into the peritoneal cavity of a guinea-pig, the death of the animal was due to streptococcus infection.

Histology.—The conjunctival growths were examined histologically in only five cases. In Wylie's case (15) they were described as consisting of simple granulation tissue. In one of Gifford's cases "one of the larger granulations showed the ordinary structure of a granulation tumor with more fibrous tissue than usual, and a number of giant cells containing vacuoles." In the writers' case the growths also consisted of granulation tissue, which, however, presented special and characteristic features evidently overlooked in the former cases. The writers feel sure that the giant cells with vacuoles, mentioned by Gifford, were really large phagocytic cells such as those seen in their case. The description of the lesions given by Morax and Massoulian in the two cases of Chaillous (18 and 22), so far as it goes, is in agreement with the histological findings in the writers' case. The cellular infiltration was stated to be diffuse, superficial, and to consist of lymphoid and phagocytic cells. No mention, however, is made of cell necrosis, a marked feature in the writers' case, or of the difference in character between the infiltration in the deeper and superficial tissue. The illustrations published by Chaillous show little or nothing.

In Wylie's case, smears from the contents of the broken-down gland showed cellular detritus and an occasional pus cell. This would seem to indicate that the changes in the gland were due to necrosis and not to suppuration, just as the writers found to be the case in the conjunctival lesions. Morax and Massoulian, in the extirpated gland examined by them (Case 18), described the condition as simple lymphoid hypertrophy. They noted numerous phagocytic cells, but say nothing in regard to necrosis.

Conjunctival ulcers, as already stated, occurred in nine cases. Whether these were due to actual suppuration or simply to breaking down of necrotic areas it is impossible to say from the data at hand, since no microscopic examination has been made of the ulcers, or even of the material discharged from them. Inasmuch, however, as absence of pus cells was a characteristic feature of the lesions in the writers' case, and apparently also in the cases examined by Morax and Massoulian, it seems probable that the ulcera-

tion was due either to necrosis without suppuration or to a secondary infection with pyogenic bacteria. With the view of Gifford, that the polypoid outgrowths arise from the site of former ulcers, the writers do not agree. In their case, not only the histological but also the clinical evidence is against it, since new vegetations developed while the case was under observation, while ulceration did not occur at any time.

Etiology.—The bacteriological and histological investigations just referred to, although not numerous, indicate fairly definitely that the causal agent in Parinaud's conjunctivitis is not any one of the known micro-organisms, and is not pyogenic. Then, too, the peculiar clinical characteristics of the disease and its rare occurrence suggest some unusual infectious agent. As regards the source of the infection, Parinaud, as already mentioned, believed the disease to be of animal origin. It so happened that his first three cases had all come in contact with animals. The theses of Sans and Dominique lent additional weight to this view, since in all but one of their cases a similar history was obtained. Gifford was the first to cast doubt upon it, animal contact in his four cases being practically excluded. In the total list of cases, the writers find eleven in which there was some sort of animal contact. Thus, some of the patients lived or worked in butchers' shops, others on farms, etc. It is to be noted, however, that in only one case (Case 5), and that a somewhat atypical one, was there a history of contact with an animal known actually to be diseased, and in twelve cases no history of any sort of animal contact was given.

In the recent paper of Chaillous, it is stated that Parinaud suggested foot-and-mouth disease as the source of the infection. Acting on this suggestion, Chaillous brought one of his cases (Case 18), the history of which gave some evidence of animal contact, to the laboratory of M. Nocard, in the École d'Alfort. The lesions did not impress the experts as resembling those of foot-and-mouth disease; nevertheless, as mentioned above, inoculations of scrapings from the conjunctiva were made upon the mucous membranes of young pigs, but with negative results. It is a rather striking fact,

however, that Parinaud's conjunctivitis has been reported only in France and America, countries in which foot-and-mouth disease is especially prevalent. Moreover, five of the American cases occurred in cattle-raising sections, and one in Boston, a seaport from which cattle are exported in great numbers. The other case, the writers', gave no history of animal contact, but foot-and-mouth disease had recently made its appearance, for the first time in years, in the vicinity of the town in which the patient lived. However, about all that can safely be said in regard to the theory of animal origin, is that at present it is merely a leading hypothesis based upon highly unsubstantial grounds. But in the lack of any other hypothesis it certainly merits some consideration.

Diagnosis.—Judging by the cases thus far reported, the diagnosis of Parinaud's conjunctivitis should not, generally speaking, present any difficulty. Atypical cases of trachoma, tuberculosis, follicular conjunctivitis, and lymphoid hypertrophy of the conjunctiva, associated with an incidental enlargement of the preauricular or submaxillary gland, are about the only cases which might be confounded with it. In such cases it is important to bear in mind that the glandular enlargement in Parinaud's disease is practically synchronous with the onset of the ocular symptoms, and that the glands at some stage in the process show signs of active inflammation. From clinical evidence alone, however, the diagnosis can not be positively made once, but the case must be followed throughout its course.

If, as the writers believe, the histological changes found in their case are characteristic, a careful microscopic examination of the polypoid growths should in any case make the diagnosis certain.* Histologically the process bears a closer resemblance to trachoma than to any other affection of the conjunctiva, but it could scarcely be mistaken for this disease. The most important difference lies in the fact that the changes are not localized in the pre-existing lymph

* The choice of a fixative is not an unimportant matter, and the writers can not too strongly urge the use of Zenker's fluid. It is of great importance, too, not to crush or squeeze the tissue during its excision.

follicles, as in trachoma, but occur diffusely beneath the conjunctiva. Then again, while the cellular infiltration is somewhat similar, it is yet different from that met with in trachoma. In the latter, the structure of a lymph node is to a great extent preserved, the centre, often almost the entire follicle, consisting of "mother cells," among which there are a greater or less number of phagocytic cells. In Parinaud's conjunctivitis, on the other hand, "mother cells" are notably absent, and the epithelioid cells are far more numerous and prominent. In trachoma, at the stage when the cellular infiltration most closely approaches in character that of Parinaud's conjunctivitis, organization is not so far advanced. Finally, in trachoma, cell necrosis is comparatively insignificant.

Treatment.—Strong antiseptic solutions were frequently used, sometimes with apparent benefit, but in several cases they aggravated the condition. Mild collyria, heat, touching the ulcers with solid nitrate of silver, incision and excision of the vegetations, puncture of the granules and vegetations with the galvano-cautery, were all employed. For the glandular swelling, quinine, arsenic, etc., were given internally, while iodoform and ichthyol ointments were applied locally. Judging by the character of the lesions, as shown by the microscopic examination, it would seem improbable that antiseptics could have any effect on the infectious agent without producing too great a destruction of tissue. The most rational treatment would consist in the use of weak antiseptic collyria, to prevent a secondary infection, and in the early and repeated excisions of the vegetations. Certainly the improvement in the ocular condition, and in the glands as well, which followed this procedure in the writers' case was marked and prompt. E. R. Wylie strongly recommends Fowler's solution, but as this was given in conjunction with other treatment, both in her case and the writers', no definite conclusions can be drawn as to its value. The glandular condition in its acute stage is best treated by the local application of heat, and in case of abscess formation by incision and drainage.

CONCLUSIONS.

(1) The primary lesion in Parinaud's conjunctivitis is superficial, being confined almost exclusively to the subconjunctival tissue, and consists essentially in cell necrosis, followed by proliferation of connective tissue.

(2) The agent which produces the local lesion is non-pyogenic, suppuration, if it does occur, probably being due to a secondary infection.

(3) The infection is in all probability not due to any of the known micro-organisms.

(4) The theory of animal origin is grounded upon insufficient evidence.

(5) The most efficient treatment consists in the early and repeated excision of the polypoid vegetations.

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Author.	Sex. Age.	Eye.	Situation of Lesions.	Character of Lesions.	Glandular Involvement.	Duration.
1. Parinaud	Female 34	O D	Superior fornix and tarsus.	Red and yellowish transparent vegetations. One erosion.	Right. Preauricular. —— Abscess.	Four months.
2. Parinaud	Female 24	O S	Throughout almost whole conjunctiva.	Red vegetations. Yellow granules.	In front of left ear. Cervical. —— Abscess.	Three months.
3. Parinaud	Male 4	O S	Over almost whole conjunctiva.	Reddish semitransparent vegetations. Small yellow granules.	Left. Preauricular and retromaxillary. —— Abscess.	More than two months.
4. Sans	Female 22	O D	Upper palpebral conjunctiva.	Button-like granulations surmounted by yellow points.	Right. Preauricular, retromaxillary, and cervical.	Six weeks.
5. Sans	Male 25	O D	Upper palpebral conjunctiva cornea.	Red elevations. Small corneal infiltrates.	Right. Preauricular.	Two and a half weeks.
6. Sans	Female 17	O D	Upper palpebral conjunctiva.	Red, irregular, button-like granulations, some surmounted by yellow points.	Right. Preauricular group. —— Abscess.	More than three months.
7. Kalt.	Female 53	O D	Upper tarsus.	Fungous growths. Ulceration. Small granules.	Right. Preauricular. Retromaxillary. —— Abscess.	Seven weeks.
8. Parinaud	Female	O D	Upper and lower tarsus. Upper and lower fornix.	Large, red, semitransparent granulations. Small granulations.	Right. Preauricular and retromaxillary.	Six weeks.
9. Despagnet	Male 10	O D	Upper fornix. Upper and lower tarsus.	Cauliflower-like excrescences. Small red and yellowish granules.	Right. Preauricular. Parotid. Cervical.	Two and a half weeks.
10. Gifford	Male 43	O D	Tarsi and fornices.	Large rounded granules. Superficial ulceration.	Right. Preauricular. Retromaxillary.	A few months.
11. Gifford	Female 7	O S	Fornices. Lower tarsus.	Large polypoid granulations.	Left. Parotid and cervical.	——
12. Gifford	Male 38	O S	Upper fornix and tarsus.	Large fungiform granulations. Large ulcerated area.	Left. Preauricular. Retromaxillary.	Ten days +
13. Gifford	Male 25	O D	Fornices. Upper tarsus, bulbar conjunctiva.	Small superficial ulcers.	Right. Preauricular. Retromaxillary. Submaxillary.	A few weeks.
14. Miller	Male 12	O D	Fornices and tarsi.	Pustules 2–5*mm* in diameter. Ulcers.	Right. In front of ear and under jaw.	Three weeks.
15. E. R. Wylie	Male 32	O S	Fornices and tarsi.	Large granulations. Superficial ulcers.	Left. Retromaxillary (abscess). Submaxillary	Five months.
16. Jocqs	Male 9	O D	Upper tarsus and fornix.	Vegetations and small yellowish granulations.	Right. Preauricular. Submaxillary. —— Abscess.	Two months.
17. Chaillous	Female 41	O S	Upper tarsus and fornix.	Vegetations. Small granules. Two erosions.	Left. Preauricular. Lower retromaxillary.	Three to six months.
18. Chaillous and Toufesco	Male 16	O D O S	Upper tarsus, fornix, and bulbar conjunctiva.	Opalescent rounded projections.	Right and Left. Preauricular, swollen and tender. Cervical, axillary, inguinal, enlarged but not inflamed.	Less than six months.

Author.	Sex. Age.	Eye.	Situation of Lesions.	Character of Lesions.	Glandular Involvement.	Duration.
19. Roche	Female 55	O D O S	Upper tarsus and fornices.	Papillary hypertrophy (vegetations?).	Left side only. Preauricular. Submaxillary.	Observed during six weeks.
20. Chaillous	Male 2	O D	Lower palpebral conjunctiva. Semilunar fold and caruncle.	Vegetations and small granulations.	Right. Preauricular. Retromaxillary. Cervical.	—
21. Chaillous	Female 59	O D	Lower palpebral conjunctiva.	Large and small granulations.	Right. Preauricular.	Three months.
22. Chaillous	Male 13	O S	Upper fornix.	Large vegetations. Small granulations.	Left. Preauricular. Retromaxillary. Cervical.	—
23. Verhoeff and Derby	Female 30	O D	Upper fornix and tarsus.	Polypoid vegetations. Small yellowish granules.	Right. Preauricular. Retromaxillary.	Seven weeks.

FIBRO-MYOMA OF BULBAR CONJUNCTIVA.

By KENNETH SCOTT, M.D., F.R.C.S., London.

THE occurrence of a fibro-myoma in this position is unusual, and receives only slight cursory notice in ophthalmic writings. This instance is perhaps worthy of note, as the situation of the tumor involved the possibility of dangerous extension, which would not only have interfered with vision but might have completely destroyed the utility of the eye; besides the ulterior risk of serious consequences connected with the fact of its very rapid and active recurrence.

The growth, unfortunately, occurred in a medical colleague, and he, probably quite correctly, associates the incidence of the tumor with an accident which happened to him while engaged in his professional duties. When he was breaking a tube of vaccine at a patient's house on August 12th of last year, a small piece of the glass flew off, struck against his right eye and remained lodged there; it gave rise to much pain at the time, and was only removed with difficulty and after considerable effort on the part of those in the house. He gave the incident no further thought until a month later, in September, when he noticed a small point of redness at the site of the recent injury in his right eye, on the sclera, close to the nasal edge of the cornea. This slowly increased in size and at the same time became thickened, but was not associated with pain, discomfort, or any other inflammatory symptom. There was never any question about the possibility of this being a modified form of vaccine pustule, as the lapse of time did not correspond, nor did it bear the least resemblance to such an inflammation.

The patient at once sought medical advice, and used the

various applications prescribed, but without producing any alleviation. The local condition soon became much aggravated, the growth increasing both in area and thickness very rapidly, so that on October 12th, two months after receiving the injury, he obtained the able services of one of his friends, a surgeon, to remove the growth; this was skilfully performed with scissors, and the small tumor was removed from the surface of the eyeball as completely as possible. When I had occasion to see the eye some days after this operation, the wound had healed, and there was only a slight redness present, limited to a portion of the sclera on the inner aspect of the globe opposite the palpebral fissure; there was no trace apparent of any extraneous morbid tissue remaining on the eye. The patient felt no local sense of irritation, there was no lachrymation, and only some tenderness of the eye on exposure to wind or to a draught of cold air.

On November 28th, forty-seven days after the previous operation, I was consulted on account of the sudden reappearance of the growth, and found that on the same site, viz., over the nasal aspect of the sclera, close to the margin of the cornea and opposite the palpebral fissure, there was a very considerable accumulation of new solid tissue upon, and closely connected with, the subjacent scleral layer; this surrounded, but avoided covering, the area occupied by the former tumor, thus giving the appearance of there being a wide depression in its centre. The growth measured 4*mm* horizontally, 3*mm* vertically, and was approximately 1*mm* in thickness; it was of a brownish-red color, and semitransparent; its surface was polished and its margin distinct and clearly defined; there was entire absence of any sign of inflammation accompanying it. Each day it showed markedly rapid increase, both in size and thickness, so that on the 30th November I was compelled to remove it entirely.

My first incision was made in the normal conjunctiva surrounding the tumor, and then by very careful and complete dissection I excised from this marked-out area all the tissue lying superficially to the sclera. The surface thus exposed on the globe of the eye was a comparatively large one, but it healed gradually and satisfactorily, and became completely covered with new epithelium without the formation of any cicatricial contraction. Sixteen days later, on the 16th December, the eye was quiet, and the bandage and dressings left off.

Three days afterwards, when I was examining the eyes

minutely by oblique illumination, I for the first time saw on the margin of the upper eyelid of the right eye (the eye which had been affected), a delicate fine eyelash which was inverted and rubbed against the surface of the globe, almost exactly at the point formerly occupied by the tumor. The eyelash was drawn and has not reappeared. Whether this had existed previously and taken part in the causation of the tumor, or in its recurrence, are questions which must remain undecided. The offending eyelash was exceedingly fine, and could only be seen when examined through a lens of high power.

A careful histological examination of the recurrent growth was made after its removal, and the following report was obtained: "After fixation in alcohol, sections were made, placed in carbolic thionin and stained. *Result of examination:* Fibro-myoma. The cells are elongated, with rod-shaped rectangular nuclei filling all the stroma, which is fine, ribbon-like, and very crowded. At the periphery there are some vessels containing blood and some groups of microbes (probably ulceration)."

I understand that a similar result was yielded by microscopical examination of the tumor which was originally removed.

Since the disuse of the bandage and dressings over the eye, no application or local medication has been employed, and the eye presents no indication, except on most minute observation, of its recent condition, and there is every reason to believe that permanent relief has now been obtained.

THE RELATION BETWEEN THE OCULAR MUSCLES AND REFRACTION.

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(*With two drawings in the text.*)

A GREAT deal has been written on the subject of muscular insufficiencies, but comparatively little has been written on refraction, and their relations one to the other. Differing as I do from the majority in muscle cutting, prism prescribing, and muscle exercising, I believe that too much attention is paid to the muscles at the expense of careful refraction work.

I shall refer to the opinions and statements of some of my colleagues, as a comparison to the way the subject is understood by me. Dr. Alexander Duane, in his paper, published in the Archives of Ophthalmology, November, 1901, said: "Some have supposed that there is a necessary connection between anisometropia and hyperphoria." He recorded no cases of hyperphoria under 1°. He found 15 % in low anisometropia and 32 % in high anisometropia. I believe that I have the credit of being the first one to make the statement he refers to, and, so far as I know, I am sorry to say, the only one. The first report I made was on 200 cases. Refraction was the same in both eyes in 101 cases; a horizontal tendency to deviation was present only in 91, and a vertical tendency in 10. Refraction was different in the two eyes in 99 cases; a horizontal tendency existed only in 19, and a vertical tendency in 80. The next cases reported were 524 in number. In 239 of these the refraction was the same in both eyes; the vertical tendency was 19 %,

and the horizontal 81 %. In the remaining 285 cases the refraction was different; in these the vertical tendency to deviate was 84⅔ %, and the horizontal 15⅓ %. Dr. Duane also states that less than half of his 39 cases of deviations had convergence. The reason is easily explained: 26 of his cases had myopia in one or both eyes, 6 mixed astigmatism, and 7 hypermetropia.

Dr. A. E. Davis, in a paper published in the *American Medical Journal*, November 2 and 9, 1902, says: "The physiological action of the ocular muscles, and their intimate relation and correlation in the use and movements of the eyes, have been overlooked, or at least have not been kept in mind," it seems to him. He promised to give the physiological action, but overlooked it in his paper. He said it had been demonstrated innumerable times that prisms, when worn with their bases over weak muscles, make the strong stronger and the weak weaker, but did not attempt to give the reason. He objects to the Maddox rod, as it takes away the stimulus for the fusion of images. This is exactly what we want, if we test the muscles at all. He also said: "When divergence is present in hypermetropia, no glasses should be worn except to correct any astigmatism that may be present," but gave no reason.

Dr. G. M. Gould, in the *American Medical Journal*, "Rarity of Need of Operations for Heterophoria," advised correcting the error of refraction, temporarily prescribing prisms reducing as need be, and advised the use of prism exercises. Dr. Gould and others believe that weak muscles are largely responsible for heterophoria. Dr. Savage and others believe that the cause of heterophoria is in the muscle being too long or too short, or is attached too far from or too near the cornea, and try to remedy this by partial tenotomies. Dr. Risley of Philadelphia, Dr. Weyman of St. Joseph, Mo., Dr. Connor of Detroit, and others, believe that a malformation of the orbit is largely responsible for heterophoria.

A Weak Muscle.

I do not believe that any one can give a scientific reason why an individual ocular muscle can be weak, except under

the causes producing paralysis. We may have all the muscles of the eyes weak from general debility, and it may be shown more particularly in the muscles of accommodation and convergence, as they are the muscles brought into use more, but under the prism test they will show to have their relative strength, or orthophoria.

A Short Muscle.

In other parts of the body we have rheumatic, syphilitic, tuberculous exudations, abscesses, ulcerations, etc., which cause joint affections, diseased bones, and loss of muscle tissue resulting in shortening of muscles. I believe the ocular muscles are quite an exception in this respect, for if we had such conditions in the orbit they would present themselves in some other way than a slight insufficiency of an ocular muscle. Malformation of the orbit is possible, but too rare to cause so many insufficiencies with which it is charged.

Wrong Attachment.

I do not believe that a condition of an attachment of a muscle to the wrong place on the eyeball could exist without diplopia in some direction. The image could not remain on corresponding parts of the retina, if the muscles did not have their correct attachment in the associated movements or in accommodation. When we find a patient with diplopia in associated movements, we find a patient with either paralysis or one that has had a muscle displaced by a tenotomy.

Partial Tenotomy.

When a partial tenotomy is performed, the muscle is usually reattached to the same place, as the conjunctiva and Tenon's capsule, and the outer fibres of the muscle hold it in place. Several operations may be performed on one or both eyes, and no harm is done so long as the muscle is attached to its original insertion. If one succeeds in giving the correct glasses, the asthenopia is cured, and then both patient and doctor are convinced that if it were not for the

tenotomies they would never have been relieved of the asthenopia. I have had patients come to me wearing glasses, with a tenotomy history, and still have asthenopia. A test of the muscles would convince me that no harm had come to the muscles, and by a careful correction of the refraction I would cure the asthenopia. When the muscle forms a new attachment, as the operator intends it, diplopia is the result, especially when looking in the direction of the cut muscle, and often in accommodation. In looking straight ahead diplopia may not exist, but the patient will have asthenopia from the extra effort of the cut muscle to hold the eye straight with the fellow eye, even though the error of refraction is absolutely corrected. These cases you can not relieve until the cut muscle is advanced to its original attachment.

Just here I will mention a patient who had compound myopic astigmatism, with exophoria 5°. A tenotomy of the left externus was performed and glasses prescribed. When the patient came under my care, he stated that he had lost two years of work because he had not been able to use his eyes. Examination showed exophoria 3°, with homonymous diplopia in looking to the left. I changed his glasses, which relieved him to some extent. As I could not improve on the glasses I had given him, I decided that the only way to give him relief was to detach the muscle and bring it to its original attachment with a single stitch. When this was done and the place was healed, he had exophoria 5°, just the amount he had before the tenotomy was performed, and no diplopia on looking in the direction of the cut muscle. With the glasses on he had no exophoria. He resumed his work, and after several months he reported that he had never had any further trouble with his eyes.

Tenotomies for Squint.

Tenotomies for squint, I believe, are practised by every oculist, more or less. The last few years this practice has decreased very much. They try first to straighten the eyes by glasses, and if that fails then they do a tenotomy. This is the conservative man who has become more conservative, which I believe we owe to the introduction of partial tenoto-

mies for heterophoria. The conservative operator looked into the subject of partial tenotomies, and those who became convinced that to correct the refraction would solve the problem, also concluded that as an error of refraction caused heterophoria and heterotropia alike, if glasses would cure the heterophoria why would they not also cure the heterotropia or squint, especially if the eyes were not amblyopic, thus reducing squint operations to amblyopic eyes.

It is better not to do a tenotomy even on an amblyopic eye. In the course of a few years we usually find that the eye has turned in the opposite direction, and if it does not, the patient does not have binocular single vision, more especially noticed in accommodation. It is better to attain binocular single vision, if we can, for the vision of two eyes is better than one, if one is an amblyopic eye.

The Panas operation, which is a stretching of the muscle before it is cut, is practised by some in this country, and in their writings they claim a great deal for the operation. The immediate effect may be better than the simple tenotomy in a greater number of cases, and if so, the final outcome is just as apt to be worse (than the simple tenotomy), in the majority of cases. This final result is a turning of the eye in the opposite direction, some months or years later. A divergence in an adult is more often the result of a tenotomy of the internus for convergent squint in early life, than from any other cause. To straighten such an eye, an advancement of the cut muscle is necessary. There are several advancements bearing the name of the one who first performed them, and in them they cut off part of the muscle in order to get the desired effect. The reason this is necessary (in the Agnew operation) is this: the needle and thread are passed through the muscle only once, and that in the centre of the muscle, which is pulled up towards the cornea, while the balance of the muscle on either side of the thread lags behind, and is attached too far back to straighten the eye unless the muscle is made shorter before the advancement. The Prince operation has a double objection: the one above mentioned; and the other is that the pulley thread which is passed into the sclera near the cornea is

tied across one end of the thread which has been passed through the centre of the muscle; the muscle is brought forward by pulling on both ends of the thread, one being around the pulley thread; this pulley swags or is drawn toward the muscle, thus making it all the more necessary to cut off part of the muscle. These advancements are done for cosmetic reasons, and not with the view of attaining binocular single vision, for that would be out of the question with part of the muscle cut away.

Single-Stitch Advancement.

It occurred to me that if a muscle could be advanced without cutting off part of it, and thus straighten the eye, there would be great probability of attaining binocular single vision, or at least would make the movements of the eye in association with the other eye better. The first case that came under my charge had had three tenotomies, one on the right internus and two on the left internus. The left eye was turned outwards very decidedly. I conceived the idea of a single-stitch operation, and did it as follows: With a needle on each end of a single thread, I passed one needle into the sclera parallel to the nasal margin of the cornea, just as in the Prince operation, aiming to make the puncture and counter-puncture hardly as far apart as the width of the insertion of the muscle. The second step was tenotomy of the muscle in the regular way. The third step was to grasp the end of the muscle with a broad fixation forceps, as near as possible to the centre, and turn the end of the muscle over, exposing the under surface. The fourth step, the needle on the upper end of the thread was passed through the upper edge of the muscle (or just above the upper edge of the forceps), entering the inner side of the muscle and coming outwards through the muscle and conjunctiva; the needle on the lower end of the thread was passed under and through the lower part of the muscle, including the conjunctiva, in the same way as the upper thread. The fifth step, the fixation forceps still grasping the muscle was placed in charge of an assistant, the conjunctiva was grasped on the temporal side with forceps by

another assistant, while I held the two ends of the thread with the needles removed; the eye was pushed toward the nose, the muscle was pulled up to the cornea by the fixation forceps, and at the same time I pulled on both ends of the thread, taking up the slack thread, thus bringing the lower hole in the muscle directly over the lower hole in the sclera and the upper hole in the muscle directly over the upper hole in the sclera; I then tied the thread across in front of the end of the fixation forceps as tightly as possible, with a surgeon's knot to prevent slipping. In this way the whole width of the end of the muscle was brought up and held there, not so much by the thread in the holes of the muscle as by the thread being wound tightly around the muscle, thus fastening it very securely to the sclera with a single circular stitch, or what is called an interrupted stitch. This patient was operated on about two years ago, and some months afterward was presented at the eye section, at the Academy of Medicine. Eyes are absolutely straight, being seen by me lately.

Dr. Landolt's Advancement.

Dr. Landolt's advancement of an externus for the cure of convergent squint has the advantage over tenotomy of the internus which he claims for it. Since his paper on the operation and its advantages was published several years ago, a number of cases have been operated on in this country by his method and very satisfactory results have been reported. It is very evident to me that more attention was given to the operation than to the refraction, in the cases that have come under my notice, for in my way of understanding refraction the ametropia in some of these cases at least was not properly appreciated.

Prisms.

When a prism is used to correct esophoria with hypermetropia, it causes a voluntary or primary contraction of the internus (to prevent diplopia), to overcome the amount of the prism, in addition to the involuntary or secondary contraction of the internus induced by accommodation.

You will find the esophoria after a few days' wearing of the prism, about the same with the prisms on, showing that the internus does have an independent action, just as adduction, which can be cultivated to overcome 100° of prisms, shows an independent action, and has nothing to do with the action of the ciliary muscle. The reason exophoria with myopia increases with the wearing of prisms is that there is a voluntary contraction of the externi to overcome the prisms, which would cause a further relaxation of the interni. thus leaving the original amount of exophoria, due to the lack of stimulus to the interni. This can be corrected only by giving the myopic correction by making the ciliary muscles act as in emmetropic eyes.

Exophoria with Hypermetropia.

There is a natural tendency to convergence to a point equal to the amount of the hypermetropia, and when the person tries to read, the extra accommodation for the hypermetropia makes the eyes have a tendency to converge more than the point of fixation. This in many cases makes the letters broaden out or separate entirely into two sets of letters, which is cleared up by a voluntary contraction of the externi. This counteraction can be easily overdone and cause a tendency outwards. At the same time the ciliary muscles under such a great strain relax, and of course a relaxation of the interni results, thus throwing the eyes more under the control of the externi for the time. If we leave the convex glasses off, as Dr. Davis advises, we are no better off than when the glasses were first prescribed. The muscle cutter calls this a true exophoria, and the externus suffers the penalty for the inability of the ciliary muscle and the interni to hold up under such a load. If this extra accommodation is removed by the right convex glasses, it will remove the extra effort of convergence. The externi will not then be called into action. I have never treated these cases in any other way than to give them the proper glasses, and to my knowledge and belief I have never failed to give entire relief.

Esophoria with Myopia.

This condition (esophoria with myopia) is not very common, and then only in myopia which is the same in both eyes. In myopia we have no accommodation or less than the amount required to stimulate convergence to the point of accommodation. The interni take on an independent contraction to produce sufficient convergence to prevent crossed diplopia. A forced action of an individual muscle that is outside the laws of accommodation and associated movements of the eyes may produce heterophoria, and in the case of myopia may produce esophoria. Correct the myopia, force the eyes to accommodate as in emmetropic eyes, and the convergence we have then is produced by the action of the ciliary muscle, or the natural convergence.

Pseudo and True Heterophoria.

Dr. Savage and others call the heterophoria that can be corrected by glasses "pseudo," and that which cannot be corrected by glasses the "true." That is, the esophoria remaining after the hypermetropia is corrected, the exophoria remaining after the myopia is corrected, esophoria with myopia, and exophoria with hypermetropia they call the true heterophoria and should be treated by partial tenotomies.

I believe that the reason these cases are not all found to be "pseudo" is that the refraction work is faulty. I base this statement from a large percentage of my patients who have been under those who believe in true heterophoria. I take the history of the muscle-cutting and those who declined to have the muscle cut; I then measure the glasses they have with them which the doctor declares are right. I make my examination and the result shows as follows: they have given the manifest hypermetropia which may range from one fourth to one half the total. My examination with the ophthalmoscope will show very close to the total amount of hypermetropia. The twenty-foot test will show about the amount probably of the glasses they are wearing. This may not be more than 25 per cent. of the total, with esophoria probably less with the manifest correction. After increasing the glasses as much as possible

with both eyes together, I then have them try to read Jaeger No. 1. If they cannot do this with the manifest, I increase the glasses until they can, and still increase as long as the eyes become more comfortable with each change, until I reach the limit of comfort. This is compared with my ophthalmoscopic examination. I then compromise by giving them the weakest glass with which they can read perfectly comfortably in order to give them the best vision possible for the distance. If it is necessary for them to wear the glasses all the time, it will not be long before they have normal vision for the distance. I often find it necessary to give them about the total correction before the eyes are comfortable for reading. This will in time become manifest for the distance.

I sometimes find that patients are wearing a different glass for each eye, when the hypermetropia is the same. My test for twenty feet, each eye separately, will show the same as the glasses they are wearing probably. The way I detect the fact that eyes have the same hypermetropia is to increase the weaker glass to the same as the stronger; the vision of both eyes will be improved for the distance and for the near; the eyes become, as they say, more steady and feel better. Eyes with glasses $\frac{1}{4}$ or $\frac{1}{8}$ D difference usually see about the same, and sometimes less than each eye separately, and when the glasses are changed to the same, the vision usually improves one line or more. That is, if the vision is $\frac{20}{30}$ with different glasses, with the same glasses it is usually $\frac{20}{15}$, and often $\frac{20}{10}$. Another way I have of determining is this: if there is no vertical tendency to deviate, but only a horizontal tendency, I feel sure that the hypermetropia is the same. The accommodation is the same, notwithstanding that when one eye is under test the manifest may be more than when the fellow eye is under test. That is, the eye behind the blind has the same manifest as the eye under test.

The mistake made most often, I believe, in refraction, is to place a spherical lens over one eye and a cylinder over the other. This condition of refraction, in my opinion, does not exist. As the refraction in these cases is not so easily

found, they get the "scissors" more than any others. A small amount of hypermetropia is rarely ever manifest with the astigmatic correction, while the vision is often improved with the spherical alone. After a spherical only is found for one eye and a cylinder for the other, place them in a frame, give the patient the use of both eyes, then place the same strength spherical behind the cylinder that we have in the fellow eye. The vision will be improved, and the eyes will be more steady and comfortable.

Hypermetropia may be different in the two eyes when no astigmatism exists. When astigmatism exists in one or both eyes, the hypermetropia is the same in both eyes, if any exists. My explanation is this: eyes having the same amount of hypermetropia, astigmatism may develop, which would be the same in both eyes. Eyes having a difference in the amount of hypermetropia, the difference is formed into astigmatism. If there is any further development of astigmatism, it is the same in both eyes, leaving the hypermetropia, should there be any remaining, the same in both eyes.

Instead of all the hypermetropia developing into hypermetropic astigmatism, it may develop into myopia. In this case one eye may become more myopic than the other. The one that becomes more myopic is the one with the greater amount of astigmatism. This is due to the better eye fixing, while the eye of the poorer vision is discarded in accommodation, and turns outwards. In the majority of myopic eyes the myopia is different whether astigmatism exists or not.

Myopia Due to Overuse of Eyes.

I believe the starting-point of myopia due to overuse of the eye is excessive convergence in hypermetropia, first causing a tendency to divergence at the near point and then myopia. I base this belief on the history of cases who have been wearing an undercorrection for one or both eyes. These cases invariably become more near-sighted. As they usually have exophoria, it is partially corrected by the partial correction of the myopia. This remaining exophoria causes

an increase in the myopia. When the myopia is fully corrected it very rarely increases, as the exophoria disappears with the full correction. Some who inherit myopia will become myopic in spite of full correction. Excluding the inherited cases, I have seen less than a half dozen who wore the full correction become more myopic. Many patients have come under my observation who had been wearing an undercorrection for both far and near, or full correction for the distance and undercorrection for the near, a great many of them wearing the same strength glass for both eyes, when one eye was too near-sighted to be considered of any value, and sometimes a plain glass over the more near-sighted eye. All of these cases showed an increase of myopia. This looks as if the exophoria remaining with the partial correction caused the increase in the myopia, and that the starting-point of myopia is the exophoria with hypermetropia.

I have seen the externus of a high myopic eye cut and a plain glass ordered for that eye. I have in mind a case where a muscle had been cut three times, and still the eye turned outwards. The patient had never worn a correcting glass for this eye. Examination showed: R V with -4 D $= \frac{20}{15}$; L V with $-$ 0.50 D $= \frac{20}{15}$; cyl. axis 165°. With this combination the eyes were absolutely straight.

When one eye is more near-sighted than the other, they focus at different points. If an object is brought up to the far point of the better eye, it is less indistinct with the other eye, and begins to disturb the vision of the better eye by a blurred object larger than the one seen with the better eye. If it is necessary for the better eye to accommodate up to the reading point from its far point, the reading becomes still more distinct with the more near-sighted eye, and when the far point of the more near-sighted eye is reached the better eye is discarded. In any case one eye is discarded and moves out to prevent double vision. Muscle cutting will never prevent this disturbance at the reading distance. The only remedy is to make the image the same size on the retina with glasses.

Physiological Action of the Ocular Muscles.

In accommodation all the muscles supplied by the third nerve are brought into action, with a relaxation of the muscles supplied by the fourth and sixth nerves, the superior oblique, and externi. In reading or looking at anything held in the hand, the natural position of the eyes is inwards and downwards, as the hands are not raised above the horizontal plane of the shoulders. At arm's length the angle below the horizontal plane of the eye is about 30′. At the ordinary reading distance the angle is about 45′ below the horizontal plane of the eyes. As this is the most common position of the eyes in accommodation, the inferior recti are larger and consequently stronger than the superior recti. If they were, however, of the same strength and contracting equally at the same time, the inferior recti would control the eyes, as they are attached nearer the cornea, which gives a greater leverage. This is where nature demands and nature supplies.

Esophoria.

In hypermetropia the same in both eyes, the tendency to converge is equal to the amount of accommodation, and also to turn downward in the same ratio below the horizontal plane of the eyes, the eyes remaining in the same plane downward as the accommodation is the same. As I have before explained, if the hypermetropia and accommodation to the reading point are too much to be overcome by the ciliary muscles and the muscles of convergence, the result would be exophoria. In either esophoria or exophoria the eyes would keep in the same plane.

Hypo-esophoria.

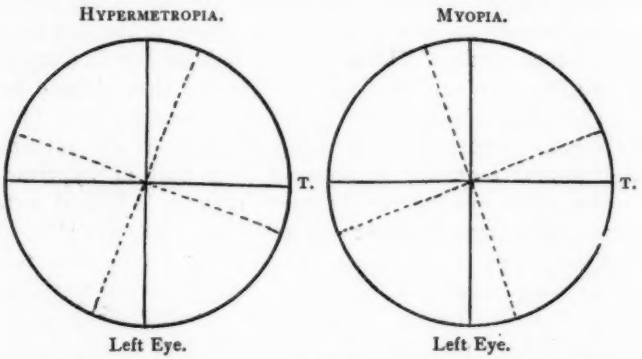
Eyes differing in hypermetropia would vary from the same plane both horizontally and vertically—that is, the eye having the greater amount of hypermetropia would have a tendency to turn inwards more and proportionally downwards more. The exception to this rule is when the more hypermetropic eye accommodates only the same amount as the fellow eye, at the expense of distinct vision for the former eye.

Torsion.

As the eyes turn inward and downward in accommodation, the vertical meridians would turn inward above and outward below, but the vertical meridians of the eyes are prevented from turning inward above by a contraction of the inferior obliques, while the lower parts of the eyes are kept in the vertical plane by a relaxation of the superior obliques, giving up the lower parts of the eyes to the inferior recti, which pull the lower halves of the eyes inward, while they pull the eyes as a whole downward, thus keeping the vertical meridian in the vertical plane (and the horizontal meridian in the horizontal plane). If one eye has more hypermetropia than its fellow eye, if that eye accommodates more, the internus and inferior rectus contract more than in the fellow eye. In this way the lower half of this eye is brought farther inwards than that of the other eye, which brings the vertical and horizontal meridians of the two eyes in different planes. This is the way oblique insufficiency is produced. My examinations have shown that oblique insufficiency exists only when the refraction is different. This applies to myopic eyes differing in refraction as well, though the oblique tendency is reversed from that of hypermetropia. The eye having the more myopia is turned outwards and downwards by the externus and superior oblique (and as it has a different focus sees less distinct and the object more magnified). In this way the vertical meridian below is pulled outwards beyond the vertical plane, while the horizontal meridian on the temporal side moves upwards above the horizontal plane. The eye which is fixing either sees without convergence, which would not change the eye from its normal position, or if it converges it is held straight just as the more hypermetropic eye. The following drawings will show the difference in torsion of the hypermetropic and the myopic eyes.

The dotted lines show the way the eyes are twisted from the vertical and horizontal planes, which are indicated by the black lines. This would show that with the hypermetropic eye a vertical line on a card placed at reading distance would tip inwards above and outwards below, while a

horizontal would incline downwards on the nasal half and upwards on the temporal half, just in the same way as paralysis of superior oblique or superior rectus. I may mention here, if the torsion should be from paralysis of one of the two muscles mentioned, it can easily be distinguished from the torsion due to the difference in the hypermetropia, and also just as easily seen which muscle it is. If it is paralysis of superior oblique, on moving a horizontal line downwards in front of the eyes it would separate into two lines, the line with the oblique axis being below the horizonal line. In paralysis of the superior rectus, moving the line upwards would make two lines, leaving the oblique-axis line upwards while the horizontal line would move downwards. A line placed vertical in front of the myopic eyes, as the drawing indicates, the line seen by the more myopic eye would tip



outwards above and inwards below, and a horizontal line would move downwards on the temporal side and upwards on the nasal side, just as in paralysis of inferior rectus or inferior oblique. Also to distinguish the paralysis from the torsion due to myopia, the lines separate as the eyes turn in the direction of the paralyzed muscle, with the line of the horizontal plane below in paralysis of the inferior rectus, and above in paralysis of the inferior oblique.

Cases.

I will report here twelve cases, which will be enough to show that it is not necessary to cut a muscle, prescribe

prisms, or leave off convex spherical glass for exophoria with hypermetropia. I have in other papers reported enough cases to show that vertical and oblique tendencies are caused by anisometropia.

CASE 1.—August 14, 1889. Dr. De P., age twenty-one. When he reads any length of time, especially at night, his eyes get hot and feverish, and feel tired. Sometimes they shut right up against his will. After holding them closed a little while, he can continue to read for a while. Vision, each eye, $\frac{20}{15}$; Hm. 0.50 D. Exophoria $1\frac{1}{2}°$. Abd. 4°. Add. 10°. Sursumduction, each, 1°. Ophth.: no lesion, + 0.75 D. Ordered + 0.50 D. June 10, 1890: Does not use his glasses nearly so much as he did at first, because he does not need them so much. When he does considerable reading he puts them on. V $\frac{20}{15}$, with + 0.75 D. Orthophoria.

CASE 2.—June 28, 1890. Miss F. B., age nineteen. For the last three or four months eyes hurt when she reads much, followed by headaches. Headache now for four days. Has seen double several times when she looks steadily at anything. Vision, each eye, $\frac{20}{15}$, with + 1 D ord. Exophoria 4°. Crossed diplopia with red glass, corrected with 3°, prism base in. Exophoria in accommodation 12°. July 25, 1890: Has no trouble whatever with her eyes. Forgets she has glasses on. V $\frac{20}{10}$, with + 1 D. With or without glasses exo. 4°. Binocular single vision in accommodation.

CASE 3.—June 16, 1894. O. W. M., age forty. Complains of seeing only one side of an object for five minutes, at three or four different times. Ophth.: no lesion, and hypermetropic astigmatism. Javal: R $1\frac{1}{2}$ D, cyl. axis 80°. R V $\frac{20}{30}$; $\frac{20}{15}$ with + 1 D, cyl. axis 90°. L $3\frac{1}{2}$ D, cyl. axis 90°. L V $\frac{20}{200}$; $\frac{20}{30}$ with + 4 D, cyl. axis 90° $\supset$ − 0.75 D. Hypophoria, left, $\frac{1}{2}°$. Exophoria, left, 1°. With the above correction, orthophoria. With red glass, hypo-exotropia, left. With red glass and above correction, binocular single vision.

CASE 4.—August 6, 1894. P. B., age twenty-three. Ophth.: no lesion, + 1 D, both. R V $\frac{20}{15}$; Hm. + 0.50 D. L V $\frac{20}{15}$; Hm. + 0.50 D. Together, Hm. + 1 D. Exophoria 12°, and crossed diplopia with red glass. Red glass with + 1 D, binocular single vision, and with the Maddox rod added to the red glass and + 1 D, shows no exophoria.

CASE 5.—Miss E. H., age thirty-two. June 4, 1900: Eyes

examined ten years ago, and cutting of muscle advised. She went to a doctor, who gave her glasses, about two years ago. Just two weeks ago she saw the same doctor, who again prescribed glasses, and advised her to have a muscle cut. He prescribed prisms in her glasses. The doctor said when he examined her before she had only 3°, and now 9°. Ophth.: no lesion, and + 2 D. Javal, ½ D. Axis 90°. Exophoria, R 12°. Hypo. R 1°. R V $\frac{20}{15}$, Hm. 0.25 D. L V $\frac{20}{15}$, Hm. 0.25 D. V = $\frac{20}{15}$, W. 0.75 D, J. I. Best W. + 2 D, has read comfortably ¾ hour, W. + 2 D, and now the exophoria is only 8° with the glasses on, ord. + 2 D. The doctor prescribed, three years ago, R + 0.25 D; prism 1½° base in. L + 0.25 D; prism 1½° base in. On May 4, 1900, he prescribed R + 0.50 D, ⊂ prism 4° base in, ⊂ ½° base up. L + 0.50 D, ⊂ − 1.25 D, ax. 180°, ⊂ prism 4° base in. June 28, 1900, V = $\frac{20}{15}$, W. + 1 D ord. The + 2 D she used a half day at a time for sewing perfectly comfortably. November 6, 1900, has pain in left eye once in a while—that is, when she has headache. She thinks the distance glasses are too weak, and the reading glasses are not just right, as she sometimes has a headache when reading. She is dependent though on both, and if she went without her distance glasses for half an hour she would have a frightful headache. Ophth.: no lesion, + 2 D. Javal, each, ½ D, ax. 90°. R V $\frac{20}{15}$; E. L V $\frac{20}{15}$; E. Together, Hm. 1 D. Exophoria 12°, W. + 1 D. Exophoria 10°. Eyes are comfortable; W. + 1½ D, both far and near, ord. September 27, 1903, with the same glasses for reading, she has a tendency to get the reading too near. Then she has pain in her left eye, and gets nervous. Ophth: no lesion, and + 2 D. Javal, each, ½ D, ax. 90°. R V $\frac{20}{15}$, Hm. 1 D. L V $\frac{20}{15}$, Hm. 1. Together, Hm. 1.50 D. Prism 2° base up over right, and Maddox rod corrects the vertical tendency, and 10° base in corrects the horizontal tendency. When she lowers her head and looks at the light through Maddox rod in front of right eye, the line of light runs higher. When she turns her head to the right and looks at the light with Maddox rod in front of right eye, the vertical line of light is to the left, or crossed diplopia. This would seem to be paralysis of right superior rectus and internus, though when only the red glass is used in front of either eye she sees only the pink light in any direction the head is turned, or binocular single vision, which would show no paralysis.

Case 6.—Miss E. K., aged thirty. January 3, 1900: Has worn glasses six or seven years for relief of headache, which

have done well. She wishes to have her eyes examined, simply because another wished it and her mother was having treatment. Her glasses are prisms. R 1° base in. L 1° base in. Ophth. : no lesion + 1 D. Javal, R 1½ D, ax. 75°; L ¾ D, ax. 135°. R V = $\frac{20}{30}$; $\frac{20}{30}$ W. + 0.50 D, ax. 75°. L V $\frac{20}{30}$; $\frac{20}{30}$ W. + 0.50 D, ax. 135°. V = $\frac{20}{15}$; W. R + 1 D + 0.50 D, ax. 75°. L + 1 D + 0.50 D, ax. 135°. Exophoria without, and less with, the glasses.

Case 7.—Miss E. W., aged thirty-two. February 3, 1900: Had eyes examined four years ago by a physician, who said the nerve of sight of the left eye was weak. She cannot see very well with that eye. Ophth.: no lesion. R + 1 D, L + 4 D + 1 D 120°. Javal, R ½ D, ax. 75°; L 2 D, ax. 120°. R V = $\frac{20}{30}$; $\frac{20}{15}$ + 1 D. L V $\frac{20}{200}$; $\frac{20}{200}$ W. + 3 + 1.50, ax. 120°. Exophoria left, and with the correction orthophoria.

June 7, 1902.—Sight still blurs through the glasses, though no headache. Could not change the glasses.

Feb. 6, 1904.—She is just getting over an acute conjunctivitis. Has no headaches, and she is sure her glasses are all right. Examination showed the glasses could not be changed.

Case 8.—Mr. L. N., aged twenty-seven. September 5, 1900: Feels all right during the day, but in the evening the sight blurs. Once in a while pain catches him just over the eyes, when he strains his eyes. Ophth.: no lesion, and astigmatic. Javal, R 2½ D, ax. 90° ; L 1½ D, ax. 90°. R V = $\frac{20}{30}$; $\frac{20}{15}$ W. + 2 D, ax. 90°. L V $\frac{20}{30}$; $\frac{20}{15}$ W. + 0.75 D, ax. 90°. Exohypophoria, right. The glasses make her eyes feel all right; ordered.

Case 9.—Mrs. E. M., aged thirty-six. September 22, 1900. Bought glasses from a travelling optician, medium smoked. He claimed that they were ground specially. They are the cheapest glasses possible, rough surface. If she reads, her eyes pain dreadfully, and pain over the eyes also. When she goes to church at night and looks at the lights her eyes hurt. She has had this trouble five or six years, but now so bad she cannot stand it. Ophth.: no lesion, + 1 D. Javal, ¾ D, ax. 90°. R V = $\frac{20}{30}$; $\frac{20}{15}$ W. + 0.50 D, ax. 90°. L V = $\frac{20}{20}$; $\frac{20}{15}$ W. + 0.50 D 90°. Together, V = $\frac{20}{15}$; W. + P. 50 D, and they are the most comfortable. Exophoria 1°, ord. + 0.50 D.

Case 10.—Mrs. W. S. D., aged fifty-nine. April 18, 1898: Her reading glasses are + 3.50 D. Complains only of dimness and specks before the eyes. When she wants to see any distance she partly closes her eyes. Ophth.: no lesion, + 1 D. Javal, R 1 D, ax. 135°; L ½ D, ax. 90°. R V $\frac{20}{30}$; $\frac{20}{15}$ W. + 1 D.

L V = $\frac{20}{30}$; $\frac{20}{15}$ W. + 1 D, $\frac{20}{15}$. Exophoria 5°. Hypo. L 1°. Red glass over left eye, the red light to the right and above and moves in to the pink light in a few seconds, and remains so in any position of eye. J. I, W. + 4 D satisfactory; ord. October 28, 1902: She found the distance glasses very satisfactory and indispensable. She had her reading glasses changed just a fraction stronger. Ophth.: no lesion, + 1 D. Javal, R $\frac{1}{2}$ D, ax. 135°; L $\frac{1}{2}$ D, ax. 90°. V $\frac{20}{30}$; $\frac{20}{15}$ W. 1.25 D; ord. (J. I, W. + 4 50 D ord.)

Case 11.—Mr. F. D. P., aged twenty-three. March 1, 1899: Had his eyes examined by three physicians, one of whom operated three times on the muscles of his eyes, the inside of both and the outside of left. His eyes had a tendency to turn outward. The operation was an advancement of the interni and tenotomy of the left. His eyes still have a tendency to turn outward. When he has a cold his eyes ache. Has pain in his eyes all the time. Vision is good, he accepts only + 0.25 D. It all seems to be in the muscles. Has been advised by all who have examined him that he did not need glasses, as 0.25 D was all that could be found. Ophth.: no lesion; + 2 D. Javal, $\frac{1}{2}$ D, ax. 90°. R V = $\frac{20}{15}$ +; Hm. 1 D. L V = $\frac{20}{15}$ +; Hm. 1 D; $\frac{20}{10}$ W. + 1 D ord. This patient was a law student, and was to graduate in about three months, but had to give up, with the idea of taking a rest, and try to graduate the following year, provided his eyes would permit. After I gave him the glasses, he resumed his studies and graduated the same year, 1899. I saw him repeatedly outside of the office until September, 1902, and he never had any more trouble with his eyes.

Case 12.—Mrs. H. J. T., aged fifty-seven. An oculist said she had cataracts. Her sight has always been poor, as she is very far-sighted. Her distance glasses are + 4.50 D, combined with prisms 3° base in over each eye. Her reading glasses are + 6.50 D, combined with the same prisms. Ophthalmoscope shows no lesion, except a small opacity in upper part of anterior capsule of right eye. The left eye shows corticle cataract on temporal side. Each eye + 5 D. Javal, 1 D, axis 90°. R V = $\frac{20}{15}$; W. + 5 D. L V = $\frac{20}{15}$; W. + 4.50 D. Together, better with + 4.50 D. J. I, with + 7.

Oct. 26, 1903.—She says she has had no trouble with her eyes since she has been wearing the glasses prescribed. Examination showed that they had not changed in any way.

REPORT OF THE MEETING OF THE OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

By Mr. C. DEVEREUX MARSHALL.

MAY 5, 1904. JOHN TWEEDY, P.R.C.S., PRESIDENT, IN THE CHAIR.

Retina and optic nerves in anencephaly.

This paper was read by Mr. Stephen Mayou, who dwelt upon the controversy as to whether the axis-cylinders of the nerve are derived from the brain or the retina, or, as is more usually held, from both. The myeline sheaths appear to develop from the brain towards the retina. In the full-termed anencephalic fœtus which he had examined, there was an arrest of development at the stage where the primary and secondary optic vesicles are formed and the nerve sheath is differentiated, but before the formation of any axis-cylinders or chiasma.

The optic nerves showed no trace of axis-cylinders anywhere. The choroid was hypertrophied, and the various layers of the retina were present with the exception of the layer of nerve fibres which was completely absent.

The condition was therefore one of a fully developed retina with the exception of the nerve fibres, which are therefore shown to be directly dependent upon the proper development of the cerebral centres.

Trachomatous pannus and its associated corneal change.

Major Herbert, I.M.S., described the corneal changes seen in the acutely progressive forms of trachoma. He frequently found that the whole surface of the cornea would stain the fluorescine, showing that it was inflamed. The marginal vascular zone never stains, showing its protective nature.

In old cases the author described a **lymphoid pannus.** In this condition, well-developed nodular elevations, feebly vascular, develop on the site of an old diffuse corneal opacity. These may coalesce and their margins overlap the sclera. Should these become inflamed they become highly vascular and thickened, forming ultimately the pannus crassus or carnosus.

Apart from this condition, the limbus may present lymphoid thickening, forming a ring around the cornea. This occurs almost exclusively in recent follicular conjunctivitis.

The permanent result of mild chronic pannus are small indentations on the cornea, which in the natives of India may become pigmented ; these are not due to ulceration, but probably to a reabsorption of the lymphoid nodules.

Trichiasis and the operations for trichiasis.

This paper was by Mr. W. E. CANT (Jerusalem).

The author dealt at first with the extreme prevalence of trichiasis in the East, and out of 68,000 cases at the British Hospital at Jerusalem 12,000 suffered from it.

Shrinking of the conjunctiva and thickening of the tarsus were the two things that rendered the relief so difficult.

Of the various operations, the author gave the preference to Snellen's, in which a wedge-shaped piece of tarsus was removed. With this operation complete correction of the deformity is possible, the lashes can be turned well outwards, no raw surface is left, healing is rapid and complete, and its effect can be modified to suit even severe cases. For these cases the original V-shaped incision is converted into a U, and the tissues are removed down to the conjunctiva. The sutures, he suggested, should be inserted from the lid margin, behind or beneath the lashes and out through the lower lip of the cut, so that on drawing the two ends together great eversion is produced. If the entropion extends quite into the canthi, canthotomy or canthoplasty were employed as adjuncts.

Dr. ROCKLIFFE read short notes on the following cases :

I.—Atrophy of both optic nerves with primary amenorrhœa.

This case had been under observation for six years, with steadily increasing atrophy and no other special or general symptoms. There was deep blue cupping, but no neuritis or

hemorrhage. The retinal vessels were not attenuated, and with the exception of an infantile uterus and undeveloped sexual organs, the remaining organs were healthy.

II.—**Optic neuritis following concussion of the globe.**

The patient received a severe blow on the eyeball (right), immediately followed by loss of vision, with intense optic neuritis. There was neither wound of the eyeball, traumatic cataract, nor displacement of the lens, hemorrhage into the vitreous, ruptured choroid, nor detachment of the retina. There was, in addition to the optic neuritis, a hemorrhage into the yellow spot with iritis.

Three months later, the vision of the left eye failed—functional. Six months later, the vision of the left eye became normal and the right improved to $\frac{6}{18}$ and J. 4.

III.—**Unusual sequence to cataract extraction.**

The patient, a decrepid old man, after an uncomplicated extraction, developed on the fourth day a dense diphtheritic-looking membrane of both lids and surrounding cornea. The pupil became blocked ; there was no chemosis or pain nor was there swelling of the lids. The corneal epithelium exfoliated and the eye was eventually excised, when the cicatrix appeared healthy and perfectly healed. The anterior and posterior chambers were normal, but the coloboma and iris were blocked with a thick yellow membrane with considerable iritic thickening.

IV.—**A peculiar outbreak of granular ophthalmia.**

There were seven cases, all of whom had been nursing a diphtheritic child. They each had an acute attack of granular ophthalmia without trachoma or membrane. It affected the lower lids only in five of the cases ; both eyes were affected at intervals of a few days. In all there was a subnormal temperature, depression of spirits and lassitude, but no other general symptoms. The attack ran a similar course in each case and lasted fourteen days.

The bacteriological examination was negative, except in one examination where the bacillus xerosis in large quantities was present. The examination was carried out by the Clinical Research Committee.

Card specimens were shown by the following :

Mr. A. L. WHITEHEAD: **Pathological specimens.**

Mr. HARMAN: **Case of paresis of certain third nerve muscles with overaction of others.**

Dr. BRONNER: **Specimen of acute abscess of Tenon's capsule.**

Mr. DOYNE: **Peculiar condition of the lachrymal sac following injury.**

Mr. PARSONS: **Tubercle of the choroid.**

Mr. LAWFORD and Dr. TAYLOR: **Case of myasthenia gravis.**

Mr. BICKERTON: **Retinal changes one week after contusion of the eyeball, hereditary optic atrophy in two brothers.**

Mr. MAYOU: **A method of differential staining for retinal and other nerve ganglion cells.**

Mr. PATON: **Two cases of congenital dislocation and malformation of the lenses occurring in a brother and sister.**

Messrs. SILCOCK and ANDERSON: **Arterio-venous aneurism of the cavernous sinus.**

Mr. C. BLAIR: **A case of rupture of the choroid.**

SYSTEMATIC REPORT ON THE PROGRESS OF OPHTHALMOLOGY IN THE SECOND QUARTER OF THE YEAR 1903.

By Dr. G. ABELSDORFF, in Berlin; Prof. ST. BERNHEIMER, in Innsbruck; Dr. O. BRECHT, Prof. R. GREEFF, Prof. C. HORSTMANN, and Dr. R. SCHWEIGGER, in Berlin:

WITH THE ASSISTANCE OF

Prof. A. Alling, New Haven; Prof. E. Berger, Paris; Dr. Dalén, Stockholm; Prof. Hirschmann, Charcow; Dr. J. Jitta, Amsterdam; Dr. Krahnstöver, Rome; Mr. C. Devereux Marshall, London; Dr. P. von Mittelstädt, Metz; Dr. H. Schultz, Berlin; Prof. Da Gama Pinto Lisbon; and others.

Translated by Dr. Ward A. Holden.

(*Continued from page 354.*)

XII.—CORNEA, SCLERA, ANTERIOR CHAMBER.

235A. **Fleischer.** Two further cases of greenish discoloration of the cornea. *Klin. Monatsbl. f. Augenheilk.*, xli., 1, p. 409.

236A. **Sachsalber.** On the degeneration after loss of corneal substance in general nutritive disorders (atrophia infantum). *Zeitschr. f. Augenheilk.*, ix., Ergänzungsheft, p. 395.

237. **Pick, L.** A case of keratitis disciformis. *Deutsche med. Wochenschr.*, 1903, No. 28, Vereinsbeilege, p. 218.

238. **De Waele.** On keratitis after inoculation of staphylococcus aureus in rabbits. *Graefe's Archiv*, lvi., 1, p. 66.

239. **Fuchs.** On ring abscess of the cornea. *Graefe's Archiv*, lvi., 1, p. 1.

240. **Villard.** Anatomical examination of an eye with hypopyon keratitis. *Ann. d'ocul.*, cxxix., p. 401.

241. **Dolganoff** and **Sokoloff.** On the formation of pus in the cicatricial cornea and on the conditions in which micro-organisms may pass through the cornea into the interior of the eye. *Arch. f. Augenheilk.*, xlvii., 4, p. 361.

242. **Proeller.** On transplantation of the cornea in severe ulcerative processes of the cornea. *Graefe's Archiv*, lvi., 2, p. 315.

243. **Dor.** Tuberculosis following an injury of the cornea. *Rev. génér. d'opht.*, xxii., p. 252, 1903.

244. **Tertsch.** A cyst on the posterior surface of the cornea. *Graefe's Archiv*, lvi., 2, p. 303.

245. **De Lapersonne.** Sarcoma developing in a stump of an eye in an infant. *Arch. d'opht.*, xxiii., 4, p. 213.

246. **Wintersteiner.** Rupture of the sclera in a posterior staphyloma. *Klin. Monatsbl. f. Augenheilk.*, xli., 1, p. 499.

247. **Snell, Simeon.** On peritomy for diffuse corneitis and other affections of the cornea. *Lancet*, May 30, 1903.

248. **Marshall, C. Devereux.** On certain diseases of the cornea met with in children. *The Practitioner*, January, 1903.

249. **Collins, Treacher.** On the children of patients who have had interstitial keratitis. *R. L. O. H: Reports*, vol. xv., part 3.

250. **Burnham, G. Herbert.** Remarks on certain diseased conditions of the cornea. *Ophth. Review*, March, 1903.

251. **Alt.** Episcleritis and scleritis. *Amer. Jour. of Ophth.*, April, 1903.

252. **Barkan.** Report on a case of tuberculosis of the cornea, iris, and ciliary body. *Occidental Med. Times*, April, 1903.

Fleischer (235A) saw in Tübingen two cases of greenish discoloration of the marginal zone of the cornea. Fleischer calls attention to the fact that the three cases that have been seen were in patients having nervous diseases and being poorly nourished, so that the condition perhaps was acquired and not congenital.

Sachsalber (236A), in a mild case of blennorrhœa, found yellowish elevated infiltrations in the cornea which quickly disappeared notwithstanding the presence of gonococci on the conjunctiva. The blennorrhœa improved, but xerosis developed, and the child died of atrophy.

Sections of the cornea showed in the cicatricial areas deposits of fixed corneal cells or their nuclei lying in the cicatricial tissue. Clinically the case was one of blennorrhœa passing over into xerosis.

Pick's (237) case of keratitis disciformis (a central gray placque composed of fine dots lying in the middle layers of the cornea with stippling of the epithelium) improved after an iridectomy.

De Waele (238), working under Marchand on staphylococcus ulcers in rabbits, came to the following conclusions: The immi-

gration of round cells begins (*a*) from the conjunctival secretion through the inoculation opening, and (*b*) from the vessels at the margin of the cornea through the lymph spaces. After the ulcer becomes clean the number of wandering cells becomes gradually less, first at the limbus and later in the cornea proper. The degeneration of the corneal tissue—the formation of the cicatrix—is brought about by the corneal corpuscles alone. Leucocytes were never found to become transformed into connective-tissue cells.

Ring abscess of the cornea, which FUCHS (239) describes clinically and anatomically, is a rapidly-appearing infiltration beginning at the margin of the cornea and leading usually in a few days to sloughing of the cornea and panophthalmitis. It occurs chiefly after perforating injuries and operations, from infection of the wound. In some cases, however, the corneal wound appears clean both clinically and microscopically. And when the wound is infiltrated, this infiltration does not extend out to the marginal ring infiltration. The latter really consists of an anterior and a posterior ring, the former receiving its pus cells from the anterior ciliary and limbus vessels, while the posterior ring lies just before Descemet's membrane. Clinically the ring is sharply limited internally for a short interval, but in some the entire cornea becomes cloudy and, necrosing, is cast off *in toto*. The purulent exudation in the anterior chamber and deeper in the eye contains quantities of bacteria of various sorts. Fuchs saw recovery in one case after early cauterization. The ring abscess sometimes occurs without any preceding injury.

VILLARD (240) examined a glaucomatous eye with hypopyon keratitis. In this case the pus of the hypopyon came exclusively from the iris. The formation of pus was so pronounced in the iris that at many points the anterior epithelium was elevated. There was no accumulation of leucocytes about Schlemm's canal.

BERGER.

DOLGANOFF and SOKOLOFF (241) studied experimentally the purulent infection that follows trifling injuries in eyes in which Descemet's membrane has been perforated, with subsequent good cicatrization—the infection leading to a violent inflammation in the interior of the eye and ending in loss of the eye.

When micro-organisms enter the scar an abscess with hypopyon quickly develops. Staphylococci pass through the cornea in forty-eight hours; streptococci in ten hours. When staphy-

lococci are introduced into the normal cornea an ulcer forms at the point of entry and a ring infiltration appears in the periphery of the cornea. If the micro-organisms do not reach a scar they never find their way into the interior of the eye. The general process is not different when the iris is healed into the cornea.

PROELLER (242) reports on fifteen cases of transplantation of the cornea done in recent years by von Hippel in eyes in which there had previously been extensive ulceration of the cornea. In half of the staphyloma cases flattening resulted; three large prolapses of the iris, a corneal fistula, and a keratocele. The operation is intended to do away with enucleation. The implanted flaps become totally opaque. If implanted in scars not yet free from irritation they are cast off. In three cases the flaps participated in the formation of fresh staphylomas.

DOR (243) reports a very remarkable case of tuberculosis developing in an eye after an injury. A child of four injured its cornea with a wooden toy that had been soiled with tuberculosis sputum—there being two tuberculous patients in the house who were in the habit of spitting on the floor. A hypopyon keratitis developed with a plastic iritis, necessitating an iridectomy. The appearance of tubercles in the iris caused him to enucleate the eye. Inoculations of bits of iris tissue into guinea-pigs produced a characteristic tuberculosis. BERGER.

TERTSCH (244), examining an enlarged blind eye with a bulging cornea, found a cystic detachment of Descemet's membrane. The cavity communicated through a broad rupture in the membrane with the anterior chamber. The cavity was lined with a layer of endothelium continuous with that on the posterior surface of Descemet's membrane. Tertsch believes that with the bulging forward of the cornea the membrane of Descemet became detached from the remainder of the cornea, and with the further stretching a rupture occurred and the endothelium passed through it.

DE LAPERSONNE'S (245) patient was a child of four in whom, eighteen months before, a staphyloma of the cornea, due to ophthalmia neonatorum, had been excised and a good stump obtained. In this stump a tumor had developed which had extended back into the orbit and involved the optic nerve. In the interior of the stump was a meshwork filled with round cells with a large nucleus. The tumor, which was a sarcoma or a glia-sarcoma, had completely destroyed the retina, choroid, and the elements of

the optic nerve. Two recurrences followed. The brain became affected and the patient passed from observation.

v. MITTELSTÄDT.

WINTERSTEINER (246) reports two cases which lead him to believe that a rupture of the sclera in the region of a staphyloma posticum is a typical form of injury in highly myopic eyes. A blunt force may act from before, but spontaneous rupture may be possible. In the cases examined there was a scar in the sclera at the seat of a rupture through which retina, choroid, and vitreous had passed out into the orbit, and loose connective tissue filled the cavity of the eyeball.

The sclera at the spot of rupture near the nerve head was only $\frac{1}{10}$ as thick as it was at the usual site of rupture—the anterior scleral ring. In the other eye of one patient, which was also highly myopic, Wintersteiner found an incomplete rupture of the deeper layers of the sclera.

SNELL (247) has performed the operation of peritomy in about 100 cases of diffuse keratitis, and considers it a remedy of considerable value in that condition. He has also done the operation in chronic ulcerative keratitis and in some cases of iritis and kerato-iritis. MARSHALL.

In this paper various forms of keratitis are discussed by MARSHALL (248), but the subject chiefly entered into is that of phlyctenular keratitis. The treatment is fully considered and much stress is laid upon the harm done by some of the older methods, especially by setons, that have been and that still are sometimes employed. MARSHALL.

COLLINS'S (249) research was undertaken to try and find out if there was any proof of syphilis being transmitted to the third generation. The fact that the mothers of the children had had interstitial keratitis was taken as proof that they had suffered from the disease. Twelve families were examined and the conclusion come to was: "That the mortality among the children of parents who have had primary syphilis is somewhat greater than amongst the grandchildren." That the difference between the average infant mortality in London (16 %) and that amongst the grandchildren of those who had primary syphilis (36.6 %) remains very marked.

That the smallness of the number of miscarriages in the twelve women the subjects of inherited syphilis would seem to show that the distrophic influence does not make itself felt upon the fœtus. MARSHALL.

BURNHAM (250) considers conical cornea is due to a certain impaired condition of the nervous system, and acting on this supposition he treats such patients with hypodermic injections of pilocarpin combined with iodide of potassium and mercury internally. He describes a case of long standing which improved markedly.

Cases of corneal nebulæ, specific and non-specific, he has seen remarkably benefited by this treatment.

"This treatment stimulates the nerve centres to a remarkable degree, and through the ordinary physiological processes of the affected part are aroused to an activity far in excess of the normal, and thus the diseased condition is acted upon and removed." MARSHALL.

Sections XIII.–XVIII. Reviewed by DR. O. BRECHT, Berlin.

XIII.—LENS.

253. **Gerok.** Clinical statistics of uncomplicated cataract. *Beiträge zur Augenheilk.*, 56, p. 137.

254. **Warschawsky.** A case of injury of the lens by a splinter of copper. *Wjest. Ophth.*, 1903, Nos. 4–5.

255. **Mayeda.** On the operative treatment of congenital luxation of the lens by discission. *Beiträge zur Augenheilk.*, 57, p. 22.

256. **Boese.** On the healing process after injuries of the posterior capsule of the lens. *Zeitschr. f. Augenheilk.*, ix., p. 575.

257. **Wernecke.** A contribution to the pathological anatomy of luxation of the lens and chorio-retinitis, with remarks on calcareous deposits and convolutions of epithelial filaments. *Klin. Monatsbl. f. Augenheilk.*, lxi., Beilageheft, p. 283.

258. **Maynard, F. P.** After-results of sixty-three cases of depression of the lens performed by Indian cataract prickers. *Ophth. Review*, April, 1903.

259. **Elliot, Capt. R. H., I.M.S.** An analysis of a further series of 250 conservative operations for primary cataract performed in the Government Ophthalmic Hospital, Madras. *Lancet*, May 2, 1903.

260. **Belt.** Operation for cataract with report of sixty-five cases. *Washington Med. Annals*, April, 1903.

261. **Burnett, Swan, M.** Hemorrhage from the eye after cataract extraction. *Ophth. Record*, March, 1903.

GEROK (253) collected 6855 cases of cataract from the University clinic at Tübingen and from the clinics of Koenigshoefer, Schleich, and Distler.

He found the sexes equally affected and the right and left

eyes equally affected. In most cases there was emmetropia or but slight ametropia. In senile cataract there was an hereditary factor in 4.9 %, in juvenile and congenital forms in 14.2 %, and in congenital alone in 16.4 %. No occupation seemed to favor the development of cataract except possibly those that necessitated working in a bright light. For senile cataract, etiological factors of importance seemed to be: acute infectious diseases and particularly influenza, next heart and brain diseases, and acute loss of blood, and gout. For juvenile cataract: febrile diseases and "spasms," although the latter must be taken with some reserve. No connection with struma was made out. In attempting to discover the cause of cataract the writer suggests a regularly carried out complete anamnesis with particular regard to vascular diseases, disturbances of general nutrition, struma, hemorrhage, and puerperium.

WARSCHAWSKY (254) saw a splinter of copper which had rested for four months in the lens, protruding slightly into the anterior chamber and being covered by the iris when the pupil was small. There were no signs of irritation and vision was 0.8–0.9. HIRSCHMANN.

MAYEDA (255) believes that if glasses do not give serviceable vision in cases of congenital ectopia of the lens discission or extraction should be done, and he reports two cases.

BOESE (256) studied the course of experimental injuries of the posterior capsule of the lens in rabbits and came to the following conclusions: There is a possibility that any wound of the posterior capsule may heal. In cases of injury from behind, tracts of connective tissue from the scar in the coats of the eye take part in the process. In cases of injury from before, this does not take place. After injuries near the equator of the lens, the wound is closed chiefly by the proliferation and formation of new fibres about the equator. This new growth of fibres may alone close isolated wounds in the posterior capsule.

WERNECKE (257) examined an eye which had been enucleated because of luxated hypermature cataract. He found new vitreous membranes upon the cornea, iris, choroid, and the excavated disc, with fibrin in the chalky, partly absorbed lens, and calcareous deposits upon the retina and at the bottom of the anterior chamber.

The couching operation the native performs is that of entering the needle through the cornea. Notes of 63 cases in which this

was done are given by MAYNARD (258). Of these, 39, or 61.9 %, obtained fairly good vision for various periods, but only 29, or 46 %, had retained it up to a limit of nearly five years. Of the 29, 5 had $\frac{6}{6}$, one each had $\frac{6}{9}$, $\frac{6}{12}$, and $\frac{6}{24}$, 3 had $\frac{6}{18}$, and 2 had $\frac{6}{36}$. The remaining 16 were not accurately tested. There were 50 eyes of males and 13 of females. Of 8 eyes in which the lens was fixed, 7 had good results and 4 of them had $\frac{6}{6}$, but of 8 in which the lens was movable 6 had good vision and two had P.L. only. Ten eyes had increase of tension, and — tension was found in 14 eyes.

Thirty-five operations were performed for the removal of the cataract in the other eye, the first having been couched, and these gave 22.85 % of failures, which occurred chiefly in patients whose other eye had been lost as the result of couching, indicating that some constitutional condition was responsible.

Twice attempts were made to remove couched lenses; once it succeeded, and in the other case the lens was found too firm to move, and it was left, but the eye recovered with $\frac{6}{6}$ vision.

A pathological report is given of the lens of one eye that was removed after couching. MARSHALL.

This is ELLIOT'S (259) second series, the first being published in *The Lancet*, in November last. In all but one case he used MacKeown's method of washing out the anterior chamber, and the more he uses it the better he likes it; 246 were done with iridectomy, 3 had had a preliminary iridectomy done, and 1 was done without iridectomy.

The cases are carefully described and classified, and 240, or 96 %, recovered with useful vision; 5, or 2 %, had bad vision but were improved; perception of light only was retained in 4, or 1.6 %; no vision remained in 1, or 0.4 %; 5, or 2 %, were failures. MARSHALL.

Choroidal hemorrhage occurred in the case of BURNETT (261) five hours after a smooth simple extraction. It was preceded by vomiting. The eye was enucleated, and a section showed the choroid with the retina completely separated from the sclera. The blood broke through the retina and choroid near the ciliary body and escaped from the wound. ALLING.

XIV.—IRIS.

262. **Kayser.** A primary sarcoma of the iris arising from a vascular nævus. *Klin. Monatsbl. f. Augenheilk.*, xli., Beilageheft, p. 136.

263. **Smirnoff.** An iridocele limbalis simulating a melano-sarcoma. *Wjest. Ophth.*, 1903, No. 2.

264. **Gourfein.** The diagnosis of tuberculosis of the iris by puncture of the anterior chamber and its treatment. *Rev. méd de la Suisse rom.*, April, 1903.

265. **Toake.** Pathological report on a gumma of the ciliary body. *Klin. Monatsbl. f. Augenheilk.*, xli., Beilageheft, p. 158.

266. **Franck.** Clinical contributions to the subject of atrophy of the iris. *Arch. f. Augenheilk.*, xlvii., p. 198.

267. **Nye.** Congenital bilateral defect of the anterior layer of the iris in members of two generations. *Klin. Monatsbl. f. Augenheilk.*, xli., Beilageheft, p. 374.

268. **Derby, G. S.** A melano-sarcoma of the ciliary body at an early stage of development. *Ibid.*, p. 124.

269. **Parsons.** Two cases of gumma of the ciliary body. *R. L. O. H. Reports*, vol. xv., Part 3.

270. **Ramsey.** The diagnosis and treatment of iritis. *Scottish Med. and Surg. Journal*, May, 1903.

271. **Barkan.** Report of a case of tuberculosis of the cornea, iris, and ciliary body. *Occidental Med. Times*, April, 1903.

KAYSER'S (262) case was one of small spindle-celled, slightly pigmented sarcoma in the iris of a girl of eighteen. There were many small cavities in the tumor, and large blood spaces and several metastatic nodules were found in the neighboring parts of the iris.

SMIRNOFF (263) concluded from his own observations and those of Lagrange: (1) that iridocele limbalis is a form of disease which at an early stage may be mistaken for melano-sarcoma; (2) the compressibility of the tumor assists the diagnosis, as does also puncture permitting the escape of the aqueous. The hernia requires no treatment so long as it causes the patient no discomfort. If the differential diagnosis is not certain, extirpation should be done, which will reveal the nature of the disease. Enucleation can then be done if the tumor proves to be sarcomatous.

GOURFEIN (264) to diagnose tuberculosis of the iris recommends injecting the aqueous humor of the affected eye into the anterior chamber of rabbits or guinea-pigs. In two cases he thus produced a tuberculosis of the iris in animals.

BERGER.

FRANCK (266) reports seven cases of atrophy of the iris. Three followed severe irido-cyclitis, three were due more to mechanical causes, and one was probably congenital.

In an eye enucleated for repeated attacks of secondary glaucoma, DERBY (268) found a melano-sarcoma of the posterior portion of the ciliary body measuring 2 x 2 x 1*mm.* The patient was a man of thirty-two.

PARSONS (269) has had an opportunity of examining three cases of this disease, one of which was published by him and Morton in vol. xxii. of the *Transactions of the Ophthalmological Society.*

Of the two cases here reported, one was in a man, aged sixty-four, with a history of a primary sore three months previously; he had well marked secondary symptoms, with the sclerotic bulged in two places by growths. The eye being blind and very painful, it was excised.

A description of its pathological condition with photomicrographs is given. In the ciliary region was found a necrotic granulomatous mass exactly like the one previously reported, and as in that case no giant cells were found.

The other case was in a female, aged twenty-five, whose left eye had been inflamed for six weeks; the vision rapidly failed and a bulging staphylomatous mass developed. There was no history of syphilis. The eye being blind and painful, it was excised. There was found to be intense irido-cyclitis and in one place there was a necrotic granuloma; there were no giant cells. The author thinks it immaterial whether these growths are considered to be gummata or condylomata. MARSHALL.

RAMSEY (270) affirms in this paper that iritis occurs in from 2 to 4 % of all ocular diseases, and is more common in men than in women, and occurs most frequently in young adults. He then describes the symptoms and chief complications met with. The various forms of iritis are described in detail, syphilitic, rheumatic, and gouty. Gonorrhœal iritis, he says, is a somewhat rare complication of gonorrhœal arthritis and tuberculous arthritis. The special treatment of each is then indicated.

MARSHALL.

XV.—CHOROID.

272. **Terrien.** Traumatic rupture of the choroid. *Soc. d'opht. de Paris*, July 8, 1903.

273. **Krukenberg.** On metastatic carcinoma of the choroid. *Klin. Monatsbl. f. Augenheilk.*, xli., Beilageheft, p. 145.

274. **Terrien.** Coloboma of the uveal tract and microphthalmus with luxa-

tion of the inferior maxilla into the orbit. Anatomical examination. *Arch. d'opht.*, xxiii., 9, p. 597.

275. **Parsons.** Metastatic carcinoma of the choroid. *R. L. O. Hospital Reports*, vol. xv., part 3.

TERRIEN (272) found that inunctions of mercury led to the rapid absorption of the extravasated blood after a rupture of the choroid.

KRUKENBERG'S (273) patient was a woman of forty-two with a carcinoma of the left breast and a metastatic growth in the left eye. The peculiarity of the case was that the tumor was not flat but elevated, occupying two thirds of the interior of the eye. This was due doubtless to hydropic swelling of the interstitial tissue.

TERRIEN (274) found in the left eye of a rabbit four months old a typical coloboma of the uveal tract. There was also a displacement of the coronoid process of the inferior maxilla into the orbit. The eyeball was small and connected posteriorly with an orbital cyst. V. MITTELSTÄDT.

PARSONS (275) gives a detailed description of a case of metastatic carcinoma of the choroid, the patient being a lady aged thirty-seven, who had suffered from scirrhus of the breast, which, with the axillary glands, had been removed in 1899. The eye was excised four years later, and in it was found a glandular carcinoma having the usual flat shape of such growths. The causes which led to this metastasis are somewhat fully discussed. The paper forms a sequel to one published in vol. xiv., part 3, of the *Reports* by Devereux Marshall, who found records of twenty-four cases. Since then others have been published, and, including the present case, thirty-three have been examined.

MARSHALL.

XVI.—VITREOUS.

276. **Straub.** Inflammation of the vitreous. *Neder. Tydschr. v. Geneesk.*, i., 17, 1903.

277. **Fromaget.** Treatment of recurrent hemorrhages of the vitreous by injections of gelatine serum. *Ann. d'ocul.*, cxx., p. 165.

278. **Silberschmidt.** The bacillus subtilis as a cause of panophthalmitis in man. *Ann. de l'Institute Pasteur*, 1903, xvii., p. 268.

STRAUB (276) states that besides the group of diseases designated cyclitis, due to infection of the ciliary body, there is another type due to infection of the vitreous, for which the discarded

term hyalitis may well be used. He describes the results of inoculation of the vitreous with various sorts of aspergillus, and, comparing these with clinical cases, finds that he can distinguish a clinical picture of hyalitis.

The etiological factors are perforating wounds, non-perforating wounds with purulent rhinitis, conjunctivitis, or other ectogenous infection in the case of eyes with staphyloma or scars, erysipelas, diphtheria, urethritis, abscess, measles, meningitis, and the like. In some typical cases of endogenous infection, however, no cause can be discovered.

In the mild cases, one finds redness, photophobia, slight disturbance of vision, slight opacity of the cornea, mild iritis, marginal synechiæ, fibrin in the pupil, and diffuse opacity of the vitreous.

In the moderately severe cases, one finds chemosis, exophthalmus, hypopyon, and increased tension. Rest in bed and the use of atropine quickly reduce the tension.

In the very severe cases, the condition may be called a purulent hyalitis, and there is usually perforation of the sclera near the margin of the cornea. To-day such cases are usually called panophthalmitis. JITTA.

FROMAGET (277) tried in two cases of intraocular hemorrhage, with good results, the hypodermic use of gelatine serum, the hemostatic qualities of which have been shown by the investigations of Dastre and Floresco, Paul Carnot, and Lancereaux.

In Case 1, the left eye became blind in spite of treatment with pilocarpine and later iodides and quinine; when hemorrhages occurred in the right eye later, the gelatine-serum was used and the patient was discharged with good vision, which four years later was still good.

In Case 2, hemorrhage into the vitreous occurred in both eyes, and treatment with iodides, cathartics, iron peptone, ergotin, and other means was of no avail. After six injections of 150*cc* of gelatine-serum (2 %), vision improved in one eye slightly and markedly in the other. In three and a half years no fresh hemorrhages have occurred. The use of the serum does not cause tetanus if it has been perfectly sterilized. BERGER.

SILBERSCHMIDT (278) reports the bacteriological examination of two eyes with panophthalmitis after injury and infection from the earth. In both cases a micro-organism belonging to the group of bacillus subtilis was found which liquefied gelatine

quicker than the others and differed in the appearance of its cultures. Injections of the bacillus into the vitreous of animals produced a panophthalmitis which never led to general infection. Three days after the injection no bacilli could be found, which the author attributes to a very active phagocytosis. BERGER.

XVII.—GLAUCOMA.

279. **Wygodsky.** The results of iridectomy in primary glaucoma and their permanency. *Wjest. ophth.*, 1903, No. 2.

280. **Lagrange.** Resection of the sympathetic in glaucoma. *Ann. d'ocul.*, cxxix., p. 439, 1903.

281. **Federoff.** Peronin in glaucoma. *Wjest. ophth.*, No. 2, 1903.

282. **Pyle.** Bilateral acute glaucoma following artificial mydriasis. *Jour. Amer. Med. Assoc.*, June 20, 1903.

283. **Peterman, H. E.** Glaucoma malignum. Report of a case with recovery of vision. *Ophth. Record*, April, 1903.

WYGODSKY (279) presents statistics of a material comprising 61,085 patients, including 1245 patients with 1777 glaucomatous eyes. Iridectomy was done in 458 eyes—hemorrhagic and absolute glaucoma being excluded; 315 eyes were under continued observation after the operation for two years or more, and of these 37 had acute inflammatory glaucoma, 148 chronic inflammatory, and 129 glaucoma simplex.

In acute inflammatory cases, iridectomy gave in 81 % favorable lasting results—vision as good or better than before,—and in 19 % unfavorable—later diminution of vision or blindness.

In chronic inflammatory cases in private practice, 30 % being operated on in the prodromal stage, favorable results were secured in 60 %; clinic cases, 11 % in the prodromal stage, had favorable results in only 35 %.

In glaucoma simplex of the typical type, the advance of the disease was checked in 11.5 %; cases with intermittent inflammatory attacks had favorable results in 32 %.

The immediate results of the operation were: in acute inflammatory, 100 % of good results; in chronic inflammatory, 94 %.

HIRSCHMANN.

LAGRANGE (280) reports a case of acute glaucoma in a woman of sixty-two and an infantile glaucoma in a child of three years, in which he resected the cervical sympathetic. The only permanent result was a narrowing of the palpebral aperture. The tension was reduced in the first case for one week only, in

the second for two weeks. He believes that sympathectomy is of no value in glaucoma. BERGER.

FEDEROFF (281) treated nineteen cases of glaucoma simplex, chronicum, and absolutum with instillations of ½ % solution of peronin, as recommended by Smirnoff. In all cases, the instillation causes more or less complete disappearance of pain for from two to four hours. Miosis was not pronounced. Tension was diminished, and vision usually improved while the treatment was continued. The drug has no unfavorable local or general effects and is a reliable agent for diminishing the pain of glaucoma.
HIRSCHMANN.

PYLE (282) reports a case in which an attack of acute glaucoma followed, in both eyes, thirty-nine hours after a single instillation of a weak solution of cocaine and homatropine (1 %). Posterior sclerotomy was successful in restoring perfect vision.
ALLING.

PETERMAN (283) relates the case of a woman of fifty-two who had suffered from simple glaucoma in the right eye. Forty-eight hours after iridectomy, the eye became very hard (+ 3) and extremely painful. The anterior chamber was obliterated, but the wound was not gaping. Eserine, anodynes, and sodium salicylate in large doses were employed, and after ten days the eye began to improve, finally attaining V = $\frac{10}{10}$. There were some lens opacities after the operation which seemed to clear. The other eye was operated upon two years later, during an attack of acute glaucoma, and made a good recovery. Since apparently there was no accident during the first operation, the attack was considered malignant glaucoma. ALLING.

XVIII.—SYMPATHETIC OPHTHALMIA.

284. **Wingenroth.** On sympathetic inflammation. *Beiträge zur Augenheilk.*, 57, p. 1.

285. **Blaschek.** Sympathetic ophthalmia with hyperplastic inflammation of the second eye and central deafness. *Zeitschr. f. Augenheilk.*, ix., p. 434.

286. **Abadie.** Chronic infectious sympathetic ophthalmia. *Arch. d'opht.*, xxiii., 5, p. 257.

WINGENROTH (284), on the basis of four observations, inclines to the hypothesis that sympathetic uveitis is a bacterial, and pure papillo-retinitis a toxic, affection.

BLASCHEK'S (285) patient was a boy of twelve with a copper in-

jury of one eye. This eye showed signs of exudative inflammation, while in the other eye, which became inflamed, there was hyperplasia leading to enlargement and protrusion of the eye giving the impression of a sarcomatous tumor. After the disease had lasted five months, fever and delirium came on, and in the course of two weeks a total central deafness developed without involvement of other nerves. Similar cases have been observed by de Wecker, Garrigan, Rogman, Snellen, and Sachs, and after discussing these the author offers explanations of the affection of the auditory nerve.

The form of disease called by ABADIE (286) chronic infectious sympathetic ophthalmia, in which without inflammatory changes in the iris the vitreous becomes diffusely cloudy, is due to a slow infection proceeding from an imperfect scar in the first eye. In his first case the affection came on in a patient who had been operated on for cataract, and a ring-shaped defect had appeared in the scar. Cauterization of this caused only transient improvement in the other eye, but a transplantation of conjunctiva brought about a permanent cure. In the second case the infection proceeded from an atrophic stump that was free from irritation and not sensitive, but had a funnel-shaped excavation in its corneal part. Enucleation brought about recovery.

v. MITTELSTÄDT.

XIX.—RETINA AND FUNCTIONAL DISTURBANCES.

Reviewed by DR. H. MEYER, Brandenburg.

287. **Gonin.** Two cases of obstruction of the retinal vessels with ophthalmoscopic and anatomical examination. (Contribution to the study of thrombosis of the central vein.) *Arch. d'opht.*, xxiii., 4, p. 219.

288. **Wolffberg.** The clinically important points in perimetry, with special reference to the traumatic neuroses. *Arch. f. Augenheilk.*, xlvii., p. 416.

289. **Grunert.** On complete congenital blindness. *A. f. Ophth.*, lvi., 1, p. 132.

290. **Lister, W. T.** A case of retinitis pigmentosa, with pathological report. *R. L. O. H. Reports*, vol. xv., part 3.

291. **Fleming, R. A.** Retinal hemorrhages in fracture of the base of the skull. *Edinburgh Med. Journ.*, April, 1903.

292. **Holmes, C. R.** Glioma retinæ, with report of five cases. *Journ. Amer. Med. Assoc.*, March, 28, 1903.

293. **Sherer, J. W.** Toxic amblyopia from wood alcohol. *Phil. Med. Journ.*, May 9, 1903.

In GONIN'S (287) first case, a man of sixty-four with arteriosclerosis and albuminuria suffered a sudden diminution of vision after a severe nose-bleed. Ophthalmoscopically he found extensive hemorrhages in the middle portions of the retina, particularly along the veins, so that thrombosis of the central vein was suggested. At the autopsy, which soon followed, no thrombosis was found, but an almost complete blocking of the central artery near its entrance into the optic nerve, caused by endarteritis. The author discusses the cause of the hemorrhages and inclines to the view of Reimar: ischæmia in consequence of partial blocking of the artery when the blood pressure was low during the epistaxis and rupture of the vessels with returning circulation.

In his second case, a woman of fifty-two with mitral insufficiency and albuminuria became blind suddenly in the left eye as the result of an orbital abscess due to erysipelas. Ophthalmoscopically there appeared to be embolism of the central artery with dilatation of the veins and some hemorrhages. There was also detachment of the retina downward. The author believed that there had been thrombosis of the central artery from compression, while the detachment of the retina might have been due to the orbital abscess. When the enucleated eye was examined, fresh thrombosis of all the arterial twigs on the disc was found, while the veins presented thrombi of various durations. In the trunk of the nerve there were found a fresh thrombus in the artery and an older one in the vein. The hemorrhages had occurred from both arteries and veins. The orbital abscess seems to have caused first the thrombosis of the veins and later that of the arteries, not by compression of the vessels in the optic nerve, but by a phlebitis which probably by extension to the sinus led to the patient's death.

WOLFFBERG (288) in his paper comes to the following conclusions: A visual field found to be normal in bright daylight should if actually normal suffer no contraction by reduced illumination. With diminished responsiveness of the neuroptic apparatus, perception of red suffers first. With disturbances of the photochemical functions and in reduced illumination, perception of blue is first affected. With diminution of illumination, the color limits contract but always retain their normal sequence. A field of vision that in bright daylight corresponds to that which the normal eye has in reduced illumination—that is, normal limits for white and contraction for colors—is characteristic

of diminished sensibility of the neuroptic apparatus and is found in cases of traumatic neurosis. This fatigue exists also for the macular region. Anomalies in the photochemical apparatus reveal themselves in the relation of the blue to the red limits. The blue limits are smaller than the red in their entire extent only in idiopathic hemeralopia, and in these cases this symptom can often be made out only with greatly reduced illumination.

GRUNERT (289) gives an exhaustive report of the cases of total color-blindness already reported and adds five cases observed by himself. In most cases there are anomalies of refraction, there is always photophobia, and vision ranges from $\frac{1}{10}$ to $\frac{1}{5}$, supposedly on account of anomalies of the cones at the macula. Colors are judged according to their luminosity; yellowish green is the brightest. (The usual discussion of the relative merits of the Young-Helmholtz and the Hering theories follows.—TRANS.)

The specimens examined by LISTER (290) were taken from a man who died insane, aged sixty. For twenty-two years he was known to be suffering from retinitis pigmentosa. The usual speckled appearance was seen in the eyes when they were opened. The retinal vessels were extremely small and the retina and choroid were intimately adherent. The optic disc was slightly cupped, and was covered by laminated connective-tissue which was continued into the surrounding retina. In the adjoining retina the nerve-fibre layer showed no thickening. There was only one nuclear layer visible, and this was much thinner than either of the two usually found. The layer of rods and cones was altogether absent. In the retina of the central area, practically all trace of the normal structure was lost. The ichoroid was atrophied and the chorio-capillaris had disappeared Some remarks are made on the pathology of the disease.

MARSHALL.

FLEMING (291) describes minutely cases in which retinal hemorrhages follow a fracture of the base of the skull. In such cases, when there was a great amount of subarachnoid hemorrhage retinal hemorrhages were common—in fact almost the rule. Further, when the subarachnoid hemorrhage was unilateral there was also generally hemorrhage in one retina only, but not always on the side affected. When, however, subarachnoid hemorrhage comes on gradually, no retinal hemorrhages are produced. He then proceeds to examine 12 cases, in 11 of which the base of the skull was fractured, and in one

there was a fracture of the squamous portion of the temporal bone. The cases fall into three groups: (1) Contains 5 cases of fracture in which subarachnoid hemorrhage was mostly unilateral and retinal hemorrhages were present but confined to the eye on the same side. (2) Contains 2 cases of fracture of the base in which the hemorrhage was about equally marked in both eyes. (3) Contains 5 cases of fracture of the base in which there were no retinal hemorrhages visible to the eye after death.

The conclusion drawn is that a subarachnoid hemorrhage if sufficiently rapid in its development will cause retinal hemorrhage, and that if the effusion is unilateral the hemorrhage will be confined mostly to the affected side. The exceptional cases are those in which with very considerable hemorrhage in the subarachnoid space no visible retinal hemorrhages occur. These lesions of the retina are of considerable diagnostic value.

MARSHALL.

After a general statement concerning glioma, HOLMES (292) relates the histories of five cases (six eyes). Case 1.—Third stage. Optic nerve affected beyond the point of section. Recurrence. Death. Case 2.—Beginning of second stage. Optic nerve normal beyond point of section. Three years and two months since operation. No recurrence. Case 3.—Beginning of the third stage. Optic nerve affected beyond the section. Recurrence. Death. Case 4.—End of first stage. Nine years. No recurrence. Case 5.—End of first stage. Four years since operation. Cured. Case 6.—End of first stage. Fourteen years and no recurrence.

ALLING.

SHERER (293) relates five cases which suffered more or less severely from toxic amblyopia due to drinking methyl alcohol.

ALLING.

XX.—OPTIC NERVE.

294. **De Lieto Vallaro.** Affections of the optic nerve in cases of purulent cerebro-spinal meningitis. *Klin. Monatsbl. f. Augenheilk.*, xli., Beilageheft, p. 237.

295. **Yamaguchi.** A contribution to the pathology of the optic nerve in brain diseases: 1. Recurrent choked disc with thrombosis of the central vein of the retina from sarcoma of the frontal lobes. 2. Menstrual disturbances and optic-nerve atrophy with tumors of the base. *Klin. Monatsbl. f. Augenheilk.*, xli., Beilageheft, p. 180.

296. **Fehr.** A case of circumpapillary sarcoma extending to the optic nerve and its sheaths. *Centralbl. f. Augenheilk.*, xxvii., p. 129.

De Lieto Vallaro (294) made a microscopic examination in five cases of cerebro-spinal meningitis. In three cases the micro-organisms causing the suppuration had not passed into the orbital portion of the optic-nerve sheaths, since the free communication was blocked by an exudation of cells. In one case the micro-organisms had extended to the eyeball. But in this case dilatation of the intervaginal space had been brought about by the choked disc and atrophy of the optic nerve. In this case also the eye was free from micro-organisms. The usual purulent inflammation of the eye in cases of cerebro-spinal meningitis must, therefore, in the author's opinion, be due to metastasis. The location of the retrobulbar inflammation after meningitis is the optic canal, and the inflammation is due to the pressure of the exudation.

Yamaguchi (295) describes an unusal case of brain tumor which caused death. After a post-neuritic atrophy of the disc had occurred, a marked recurrence of the swelling appeared with many hemorrhages and persisted until the patient's death. The author, after a microscopic examination, came to the conclusion that the recurrence of the choked disc was due to compression of the central vein where it passed through the obliterated intervaginal space.

This late complication, however, can not be used as an argument in favor of the idea that choked disc is caused primarily in this way.

He reports further four cases of brain tumor in which choked disc was not found, although the tumor was at the chiasm and the hydrops of the sheath was due to blocking of its approaches. In three of these cases there were also marked disturbances of motility. A consideration of the incident literature leads him to warn physicians against the idea that optic-nerve atrophy is due to amenorrhœa, since it is more likely to be true that a basal tumor causes a simple atrophy of the nerve and that the tumor may also cause amenorrhœa.

Fehr (296) records a relatively rare case—a circumpapillary sarcoma of the choroid 15*mm* in diameter. Here was observed the method of extension described by Fuchs, the so-called continued infection of the retina. The tumor had entered the optic nerve also and its intervaginal space and there had formed an extrabulbar focus.

XXI.—INJURIES, FOREIGN BODIES, PARASITES.

297. **Zur Nedden.** Report of a peculiar case of copper splinter in a human eye. *Klin. Monatsbl. f. Augenheilk.*, xli., 1, p. 484.

298. **Schimanowsky.** Two cases of copper splinter in the vitreous, extracted with preservation of the eye. *Wjest. Ophth.*, 1903, No. 3.

299. **Parsons, J. Herbert.** The healing of wounds of the retina, choroid, and sclera. *R. L. O. H. Reports*, vol. 15, part 3.

300. **Ramsay, Maitland.** Penetrating injury of the eye, with three lashes in the anterior chamber. *Glasgow Med. Jour.*, March, 1903.

301. **Juler.** A clinical lecture on injuries of the eye. *Clinical Journal*, April 29, 1903.

302. **Harman** and **Bradbourne.** A case of bullet wound of the brain, with partial motor paresis and hemianopsia. *Lancet*, May 2, 1903.

303. **Zimmerman.** Four eye injuries with introduction of foreign substances not suitable for removal by the magnet. *Annals of Ophth.*, Apr., 1903.

304. **Weill.** Report of seven extractions with Haab's electro-magnet. *Amer. Jour. of Ophth.*, May, 1903.

Zur Nedden (297) describes a case of gun-cap injury in which a bit of copper in the upper posterior quadrant of the eye wandered ten years later through the zonula into the anterior chamber without injuring the lens. The foreign body had not caused an appreciable diminution of vision in its long stay in the eye.

In Schimanowsky's (298) first case of copper injury suppuration in the vitreous had already begun. The form of the eyeball was preserved with V = movements of the hand. In a second fresher case the final result was V = fingers at *1m*; cataract from injury of the capsule by the entering foreign body. The author believes that an effort should be made to remove the copper foreign body from the vitreous before resorting to enucleation. Hirschmann.

In an exhaustive paper Parsons (299) first enters carefully and minutely into previous work that has been done and gives the results that others have arrived at.

He then describes his method of experimenting on monkeys.

The animals were anæsthetized and their pupils dilated with atropine, and the lesions were made with a Graefe's knife, which was introduced into the eye 3 or *4mm* behind the cornea; it was passed across the vitreous and the retina wounded to the required extent. After two or three weeks the animals were killed and their eyes examined.

Excellent photo-micrographs of the sections are reproduced

from the eyes of six monkeys that were experimented upon. The pathological anatomy of three eyes that were removed in the hospital for injuries is also given. He comes to the conclusion: 1. That in any wound hemorrhage greatly increases its severity. 2. The leucocytes are derived from the vascular channels, the vitreous playing only a passive part in any pathological condition. 3. The leucocytes soften and degenerate the necrosed tissue and help to fill up the broken and contused vessels, etc.; they are very active as phagocytes and they finally themselves become broken up and disappear.

The process of cicatrization is very fully entered into and the part played by both the leucocytes and the endothelial cells is discussed. Some final remarks are made on the subject of retinitis proliferans. MARSHALL.

RAMSAY'S (300) patient is a boy, aged twelve, who was struck a month before with a fragment of a broken jug. The cornea was lacerated and the iris prolapsed. Immediately afterwards several lashes were removed from the lips of the wound. The iris is now seen to be adherent to the whole wound. The pupil is dilated, but irregularly, and the lens is opaque. Three cilia are seen in the aqueous. All three were removed with the opaque lens. The pupil became partially closed by a band which was divided, the pupil then dilated, and with correction the patient was able to see $\frac{6}{9}$ and ordinary reading type.

MARSHALL.

ZIMMERMAN'S (303) cases are as follows: Case 1. Brass or copper in the vitreous for fourteen years with retention of normal vision. The foreign body could be seen in the vitreous directly behind the lens. Case 2. Multiple wounds by chestnut burr, including penetration into the anterior chamber and numerous imbedded spines. Normal vision retained. Case 3. Spontaneous extrusion of a glass fragment from the vitreous chamber after remaining undiscovered for six days. Case 4. An unsuspected fragment of stone removed from the lens after fifteen days. ALLING.

XXII.—OCULAR DISTURBANCES IN GENERAL DISEASES.

305. **Strzeminsky.** The ocular complications of scarlatina, observed in the epidemic of 1902, at Wilna. *Recueil d'opht.*, xxv., 3, p. 117.

306. **Kubert.** The affections of the eyes in leprosy. Statistical and clinical investigation. *Juriew*, 1903, p. 173.

307. **Abadie.** Grave accidents produced by the iodide of potassium in the ocular manifestations of syphilis. *Soc. franç. de dermatol. et de syphilog.*, Nov. 6, 1902.

308. **Vetter.** A case of bilateral hysterical amaurosis. *Klin. Monatsbl. f. Augenheilk.*, xli., Beilageheft, p. 355.

309. **Caudron** and **Duboys de Lavigerie.** Recurring neuro-retinitis after removal of the ovaries. *Soc. d' opht. de Paris*, Apr. 18, 1903.

310. **Chance, B. K.** The ocular complications of variola. *Amer. Med.*, Apr. 18, 1903.

STRZEMINSKI (305) observed as complications of pure scarlatina several phlyctenulæ of the cornea, particularly at the margin, and one ulcer of the cornea. BERGER.

The conclusions reached by KUBERT (306) in his very exhaustive paper are in general as follows: The eyes and their appendages are affected in 75 % of cases of lepra, these complications being more frequent in the tuberous form of the disease and more frequent in men than in women. They may appear in the early stages of the disease. All portions of the eyes and their appendages may be affected, and in many cases the lesions are not characteristic but are analogous to syphilitic affections. The author believes the ocular affections of lepra to be caused by the carrying of infectious matters in the blood just as in syphilis and tuberculosis. HIRSCHMANN.

ABADIE (307) reports two cases of syphilitic disease of the eye in which calomel injections and the internal administration of iodide of potassium caused an aggravation of the condition. In the first case intraocular hemorrhages came on in one eye, leading to glaucoma, which necessitated an iridectomy. The sight improved in the course of six months when intravenous injections of cyanide of mercury were used. In the second case glaucomatous attacks came on and ceased only when the iodide was stopped. BERGER.

VETTER (308) reports a case of marked hysteria in which all the subjective and objective signs of glaucoma were present, including increased tension and contraction of the field, so that an iridectomy was done in each eye. Four years later weekly attacks of hysteria came on with complete amaurosis lasting a few days only.

CAUDRON and DU BOYS DE LAVIGERIE (309) presented a patient from whom the uterus and appendages had been removed for fibroma eighteen months before. The patient now has a choked

disc with various general nervous disturbances and monthly aggravations. BERGER.

CHANCE (310), in an analysis of 2000 cases of variola, aside from lids' eruption, finds conjunctivitis complicated by ulcerations of the cornea the most common lesion. The cornea is not subject to the specific eruption of variola. Iritis was observed in a few cases. Deeper lesions were not found. ALLING.

MISCELLANEOUS NOTE.

Erratum.—In the footnote to Dr. Guttman's paper on Anæsthesia, p. 306 of the May number of THESE ARCHIVES, for "cocaine o 5" read "cocaine 0.05."